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STEEL

The Magazine of Metalworking and Metalproducing

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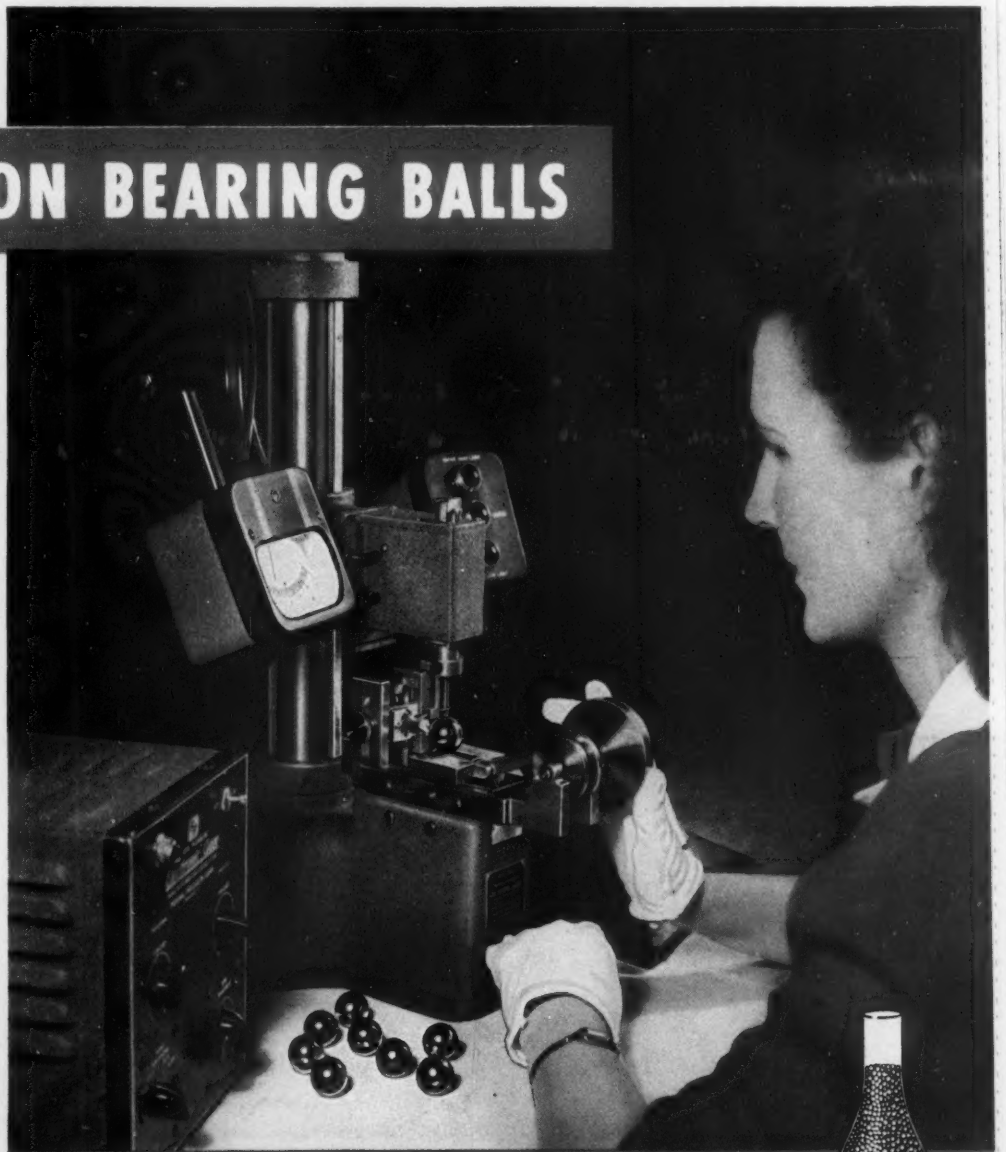

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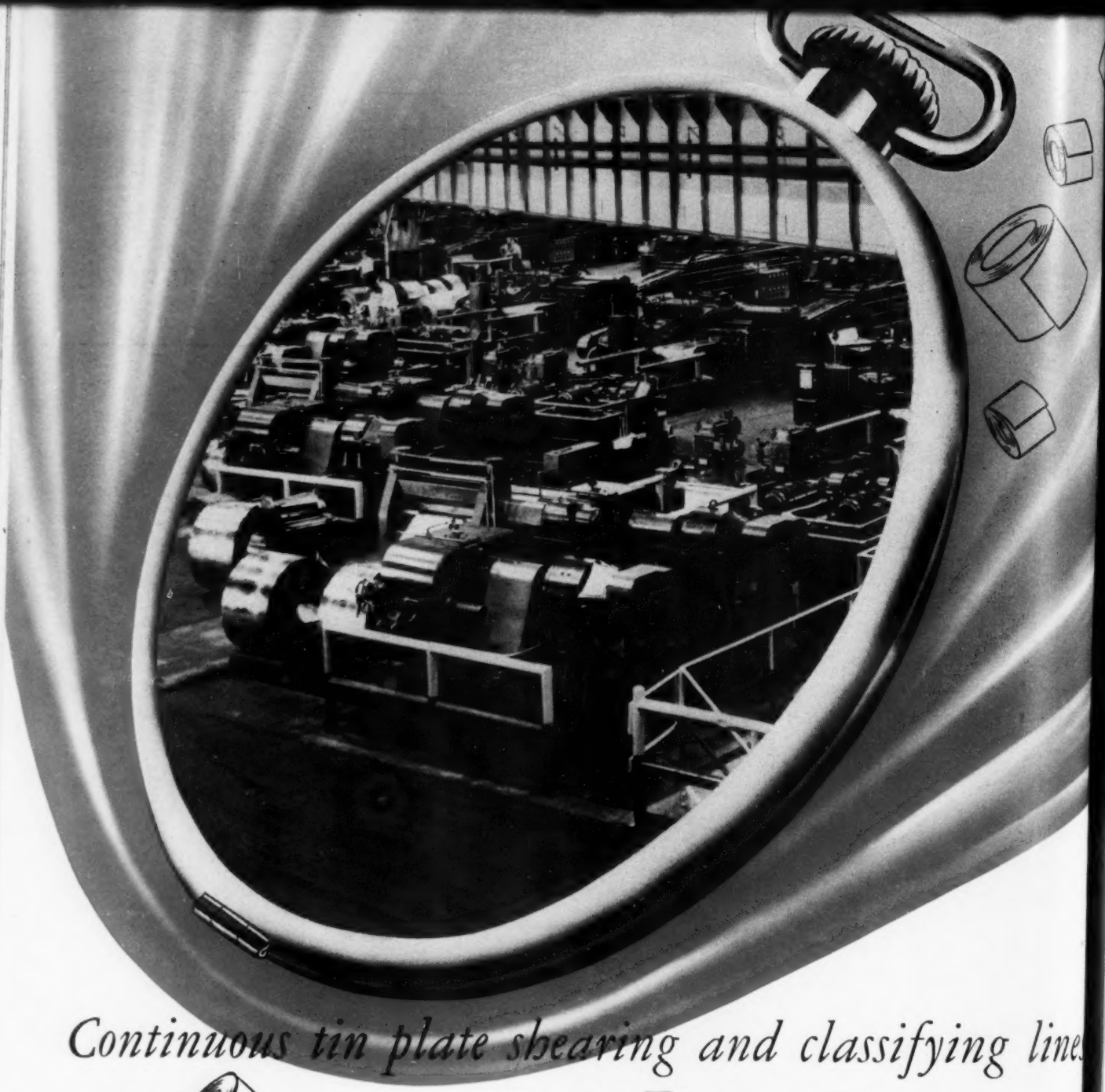
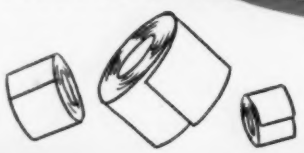
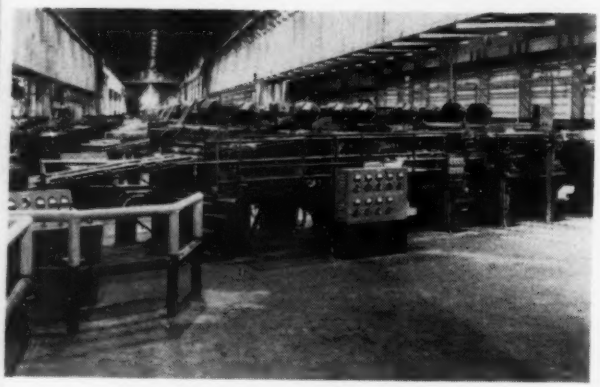
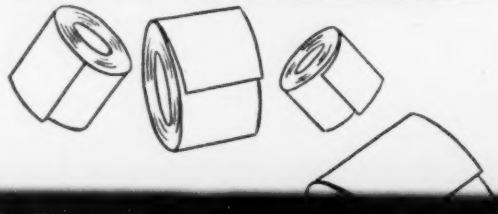


Continuous tin plate shearing and classifying lines

1,000 feet per minute . . .







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Why does he Count his chickens ...before they are "vaxed"?

"Now we've seen everything!" Every time we say that, we can count on it that someone will figure out a new way to use counters. There was the drink-dispenser, the Iron Chinaman, the map-making machine, the fishing reel, the ship's sextant, the exercise table, the bowling-pin setter and countless others.

Then came the egg-grader. So it was only a matter of time 'til another inventive mind combined a counter with a vaccinating device, to keep count of his birds as he needled them!

But why all the figuring on how to use counters? Because Veeder-Root Counters add a new usefulness to any product into which they are built as standard equipment . . . a new sales stimulant, a new profit-producer. Now, let's get together and see what counter-use we can figure out for *you!*

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Behind the Scenes...

No Eye Strain

An eight-year old boy came to call on a little girl. We don't know whether he had much to say to the girl, but here's how his conversation went with her parent, Jim Zuber, business manager of this publication:

"Magazines are getting easier 'n easier to read," said the boy.

"Oh yes?"

"First came *Life, Look* and *Pic* where all you have to do is look at the pictures. Now there's *Quick.*"

"You can read that one rapidly, all right," Zuber admitted.

"There's a new one coming out that will outdo anything yet."

"Is that so? What's it called?"

"Phhhhhht!"

All this brings us to the subject of readability or ease of reading. That problem is getting a lot of attention from the editors upstairs. From surveys, they know most of you are pushed for time and can devote only a short while to all the reading matter that comes across your desk. STEEL is edited and laid out typographically with that factor in mind. The news, engineering and market summaries give you the high spots in the stories which appear in each section. Charts, maps and tables are designed artistically and typographically to present the facts quickly and concisely. Stories are written with the same aim. If you're looking for a quick and concise resume of what's happening and what will happen in metalworking, begin reading on page 45.

Did You See It?

Did you see it in STEEL last week? U. S. Steel Corp. and Bethlehem Steel Co. iron ore reserves in Venezuela exceed 1 billion tons (p. 21, issue of Jan. 30). . .Mill pricing is giving headaches to barrel makers (p. 28) . . .Use of steel weldments can help cut costs (p. 50). . .Copper and zinc supplies are tightening (p. 92).

Trapped!

A friend of ours, an authority on office waiting rooms, reports on one he encountered in a New York city metalworking plant. He found himself in a room whose only opening was the door through which he had entered. No windows, no receptionist, just nicely paneled walls, a few Currier & Ives prints, rich looking carpet, easy chairs and magazines (including STEEL, of course). He was about to start looking for secret panels when a well modulated woman's voice made him jump almost a foot.

"May I help you?"

He looked around, saw no one, but managed to pull himself together. Standing in the center of the room, facing the wall to the right of the outside door, he mumbled his name, and that of the man he wanted to see.

"One moment please."

Short silence, finally broken by the invisible voice. "Mr. Smith will see you now." Our man heard a clicking sound behind him, turned to see that there *was* a secret panel. He staggered through, expecting never to see the light of day again.

Our Far-Flung Correspondents

A couple of weeks back we mentioned the subject of mail and the poundage the editors receive. Well, they have nothing on us. Ours has been increasing by leaps and bounds. And very interesting letters we get. One is from a gentleman who has invented an automatic continuous brine freezer to make ice cream, frozen custards and related products. He wants to "tie up with a high class firm that has sheet and metal and machining facilities" to build his product. Anyone interested should contact J. H. Westfield, New International Frozen Kustard Machine Co., 17 E. 37th St., Indianapolis.

Puzzle Corner

To continue our discussion of mail, we were flooded with answers to the gambling puzzle of Jan. 23. J. C. Newton of North American Aviation Inc. was one of the first to turn in the correct answer—$281.25.

Our request for puzzles from you readers has brought in many good ones. Keep them coming—with the solutions, please. Here's one submitted by Philip W. Morris of Republic Steel Corp. Ike has a pet monkey. Ike's age plus the monkey's age total 100 years. Ike is three times as old as the monkey was when Ike was ten years older than the monkey is now. How old is Ike? How old is the monkey?

Shrdlu

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STEEL

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New Deep Drawing Technique Promises Great Savings

Special Machinery Pays Off

Production of High Alloy Steel Castings—I

Better Welds Expected from New Electric Tube Welding Process

STEEL

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Shells of these tanks are 3/16" thick and are made of 20% chromium-nickel stainless-clad over mild steel. Likewise, manhole necks and covers have 20% stainless clad interiors. Necks of vents are ¼" solid stainless steel, with mild steel flanges.

HOW STAINLESS-CLAD *and* SOLID STAINLESS STEELS *Provide Vital Advantages for Beverage Storage*

This interior view of a hoisted tank shows the solid stainless steel angles used for top bracing.

Complex needs of the beverage processing industries have led to the use of several different chromium-nickel stainless steels to solve specific corrosion problems...

But corrosion resistance is only one of the many virtues of austenitic chromium-nickel stainless steels.

In addition, they are readily fabricated, may be welded with ease and are highly resistant to impact and wear. Parts made of these stainless steels are easy to clean and keep clean.

Charles T. Brandt, Inc., of Baltimore, Md., constructed the two 25,000-gallon storage tanks shown here of Type 304 stainless-clad and solid stainless. The tanks are adequately strong, are corrosion resistant, and do not contaminate the stored syrup.

Leading steel companies produce chromium-nickel stainless steels in all forms such as sheet, strip, bars and tubes. A list of sources of supply will be furnished on request.

Choice of the correct type for your application assures longer service life, fewer repairs and minimum maintenance.

Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET
NEW YORK 5, N.Y.

February 6, 1950

Handling One's Own Affairs

Another aspect of payroll deductions, which were discussed in this space last week, is the demoralizing effect upon employees. This is not to say that all payroll deductions are demoralizing. To deduct something from earnings for E bonds or hospitalization, at the request of the employee, is not harmful and perhaps is beneficial. But it is true that indiscriminate payroll deductions, if carried to the extremes advocated by President Truman and others, could have a demoralizing effect upon tens of millions of Americans.

For instance, consider the present withholding of income tax from employees' earnings. Manifestly the pay-as-you-earn feature is a great improvement over the former system of paying after you earned. But pay-as-you-go and withholding from payroll, advantageous as they may be to the Internal Revenue Department, involves certain practices which should be considered carefully.

One of these is the volume of work thrown upon the employer. The federal government now takes so much from employer and employee in taxes that one would think the Treasury Department could afford to pay the expenses of its tax collections. It does not. Instead it is constantly devising means whereby a greater proportion of the cost of collection is borne by already over-burdened taxpayers. Is this equitable or fair?

Another phase of withholding has to do with its psychological effect upon employees. Unlike deductions for E bonds or other items at the employee's request, withholding of taxes is mandatory. The employee has no choice. Partly for that reason he writes off the amount withheld as something he never received and in many instances he does not even consider it part of his earnings or his tax.

This is a bad situation from many angles. It gives him an erroneous idea of his earning power, of the amount his employer pays him and of the amount the government takes in taxes. The automatic mandatory features of withholding deprive him of the historic experience of handling his own income and outgo according to his own wishes.

To keep increasing mandatory deductions from payroll, as now advocated by the Truman administration, is going to impair seriously the individual's once highly prized prerogative of handling his own affairs.

* * *

NEED REFORM IN COAL: What is it that makes coal mining such a troublesome problem all over the world? British miners now are digging 4,880,000 tons of coal a week, just a trifle over the average in 1938. Output could be more except for absenteeism. When a miner has earned enough to cover expenses he knocks off for the rest of the week or month. This is one reason why coal prices have risen 148 per cent since 1938, more than any other important raw material or finished product.

In the United States we also have priced coal out of some of its attractive markets. Here the John L. Lewis 3-day or no-day week serves the same purpose as the British miners' absenteeism. Beyond that is the depressing fact that if the nation's miners were to work a 5-day week they would produce more coal than can be consumed in domestic and export markets under today's conditions.

Obviously more miners are working than are needed. The more miners' wages are increased

(OVER)

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and the higher their pensions are raised, the more difficult it is for a miner to abandon the pits and seek a better job elsewhere.

One can hope that sometime somebody will come to the fore with a constructive plan for lifting the coal industry out of its doldrums. Could it be possible that the operators of captive mines, conceivably working with a union boss other than Mr. Lewis, might take the initiative in this important reform? —pp. 58, 63

* * *

IMPROVED VISION PAYS: In November, 1947, a large midwestern manufacturing company enlisted the aid of the American Optical Co. in checking the vision of its employees and in participating in a program to correct defects in eyesight. Ten months after the program began, the company observed these remarkable results:

The company doctor had referred 280 employees for visual care out of a total of 1768—15.8 per cent. Eighty-three per cent of the persons referred had followed through and had obtained the visual help needed. This improvement almost immediately was reflected in shop records. For instance, scrap losses in 1948 were running 10 per cent below those of 1947. This represented a savings of tens of thousands of dollars a year. Accident frequency was reduced about 50 per cent and the "lost time" accident cases were reduced from 105 in 1947 to 71 in 1948.

Undoubtedly other factors contributed to these noteworthy improvements but enough credit is attributed to the vision program to warrant other manufacturers to investigate its possibilities. —p. 87

* * *

OVER-SIMPLIFICATION: It would be nice if industrial problems were as simple as lawmakers think they are. At the hearings on steel prices Representative Wright Patman favored protection for local plants from outside competition. If freight absorption is legalized, he contends, the projected steel plant in New England "would not have a dog's chance because existing steel companies would absorb freight and put it out of business."

Senator O'Mahoney can't understand why other steel companies follow U. S. Steel on prices. He asked A. B. Homer, president of Bethlehem, why Bethlehem had not held to its old prices in order to undersell U. S. Steel. Mr. Homer's answer: "The steel industry needs still higher prices but no company can advance if its competition does not advance; hence it was logical to follow U. S. Steel's increase. Last year we raised prices because of our need but our competitor did not, so we later had to return to old prices."

A course of fundamentals in marketing would help Messrs. Patman and O'Mahoney. —p. 56

* * *

FAIRER DEPRECIATION: John W. Hanes, chairman, Tax Foundation Inc. and former under-secretary of the Treasury, says that a tremendous impetus could be given to industry by liberalizing plant and equipment depreciation rates. He thinks corporations should be permitted to set their own rates with two limitations: They should not exceed 20 per cent and corporations should stick to their schedules once they are established.

One drawback to such a policy is its immediate cost. Every $1 billion in extra depreciation means a temporary loss of $380 million in revenues. This could be overcome by adopting the policy gradually over a period of years. If such a plan is adopted, Mr. Hanes sees "building expansion and renovation of plant on a scale never before equaled." —p. 57

* * *

RECHECK WATER SUPPLY: In recent months most of the publicity pertaining to water shortages has emphasized the plight of the public in affected areas such as Metropolitan New York. The water problem, which is more widespread and serious than is generally believed, is extremely important to American industry. Water tables in many areas have dropped appreciably in the past few years at the same time that large new industries have been developed which require extraordinary amounts of water.

For instance, only 3000 gallons of water per ton of coal are required in making by-product coke, whereas 600,000 gallons of water are required in the manufacture of a ton of synthetic rubber. The entire subject of water supply is much more complicated than a decade ago. Manufacturers contemplating expansion of old facilities or construction of new ones should investigate sources of water more carefully than heretofore. —p. 60

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

NEW ENGLAND STEEL— Take another look at the proposal for a New England steel mill (p. 53). It has ramifications that extend beyond that region. The New England Council argues that a mill would keep steel consumers in the area from moving closer to existing steel plants to meet competition. It costs more to bring steel into New England than to competing areas. New Englanders employ about 12 per cent of all metalworking personnel in America, but only 0.5 per cent of the nation's steel capacity is in the section. They want to build a $240 million steel plant at New London, Conn., to have a capacity of 1,250,000 tons yearly. Major steel companies have been asked to build the facilitiy. Half a dozen have turned it down because they prefer to spend their money in expanding and modernizing their own installations. In the background is the knowledge that when U. S. Steel builds its proposed new mill at Morrisville, Pa., it will enjoy a freight advantage over the proposed New London mill in the rich New York-New Jersey market (p. 55).

PRICE HEARINGS— Another round in the steel pricing duel—the O'Mahoney hearings on price increases—ended in a draw, but more is coming up (p. 56). Date for steel companies to orally present their proposal to the Federal Trade Commission for settlement of the basing point case with a consent decree is set for Feb. 14. The companies seek a settlement that would recognize their right to asborb freight in competing for business. The companies also have to appear at the end of February before still another group, Rep. Emanuel Celler's Judiciary Committee, to explain again why they raised prices . . . Nonintegrated cold-rolled strip producers raised their price 25 cents a hundred pounds (p. 55).

STRIKES— Effects of the coal and Chrysler Corp. strikes on metalworking are not yet severe (pp. 58, 68). Steel production has dropped only slightly because of coal scarcities. Power shortages may hit industry before a lack of steel does.

STEEL EARNINGS— The O'Mahoney committee members were unimpressed with the industry's pricing argument because of steel's 1949 earnings. Industry totals last year were higher than in 1948 despite the strike (p. 57). But this is a distorted picture because most producers' income last year declined. U. S. Steel Corp.'s and Bethlehem Steel Corp.'s gains were so great that they pulled the entire industry total above the 1948 level.

COAL IN EUROPE—More coal is being mined in Europe (p. 63), and it's not helping John L. Lewis at all. Exports of American-mined bituminous are slipping as a result of the production gain abroad. Declining demand for U. S. coal is one stumbling block in the UMW's drive for a better contract.

GM CUTS COSTS—A relatively new department at General Motors Corp., Process Development Section, is paying off handsomely by testing cost-saving ideas submitted by divisional engineers and other personnel. Among the many schemes PDS has studied is one to save as much as $500,000 annually by changing all corporation plants from chilled iron and malleable iron shot to cut wire shot in blast cleaning and peening operations (p. 67).

WATER— How's your water supply? The federal government (p. 60) is heading a drive against water waste and pollution. A Temporary Water Resources Committee will outline a national water policy. The Geological Survey is starting a national inventory of our water resources. The U. S. Public Health Service will ask industry to join its Technical Committee to stimulate research and waste disposal methods.

HERE AND THERE IN INDUSTRY— Hotpoint Inc. will build a new refrigerator factory in Chicago (p. 70) . . . Wallingford Steel Co.'s $1.5 million expansion and modernization program in Connecticut will boost production of specialty strip steel (p. 64) . . . Atlas Steels Ltd. will start a Canadian stainless sheet steel industry with a new Welland, Ont., plant (p. 65) . . . Bethlehem Steel Co. has bought land in eastern Pennsylvania for possible iron ore mines (p. 55)

NEWS SUMMARY
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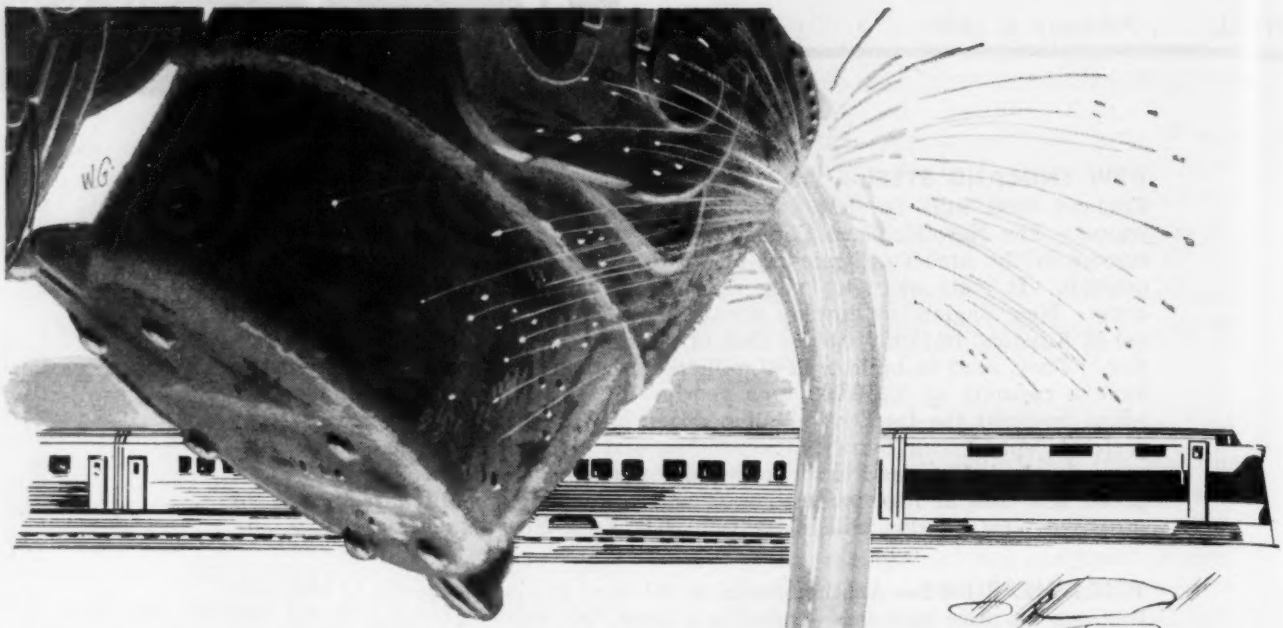

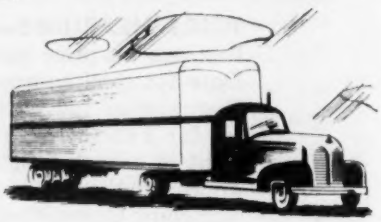

cut operating costs, increase payloads —reduce weight or increase strength

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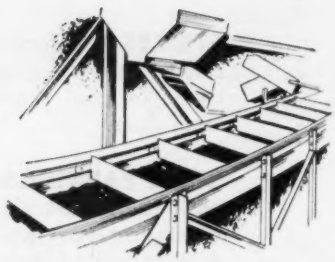

Inland HI-STEEL's high strength-to-weight ratio and its abrasion and corrosion resistance permit longer life, weight reductions up to 25%, and greater strength than ordinary structural-grade carbon steel.

These properties permit three different approaches to the problems of design and construction:

1. To design for same strength with reduced weight and greater payloads;
2. To design for greater strength with same weight and payload; and
3. To design for compromises that will allow variations of these qualities.

In each case operating costs of mobile equipment are greatly reduced.

And Inland HI-STEEL can be worked either hot or cold—punched, drawn or otherwise fabricated—welded or riveted—with little or no change in shop practice.

COMPARISON OF *AVERAGE* PROPERTIES OF HI-STEEL WITH ORDINARY STRUCTURAL GRADE CARBON STEEL

Tensile Properties (¼" Plate)	Inland HI-STEEL	Ordinary Structural Grade Carbon Steel
Yield Point (psi)	56,000	35,000
Ultimate Strength (psi)	73,000	66,000
Elong. in 8" (%)	25	25
Endurance Limit		
Fatigue Strength (psi)	49,000	33,000
Impact Resistance (Charpy Impact—ft. lbs.) Temperature		
80° F	55	36
32° F	43	33
0° F	36	26
—25° F	34	6
—50° F	30	2

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STEEL
A PENTON PUBLICATION

Steel Mill for New England?

Region wants integrated plant to escape freight disadvantages. Steel companies are reluctant to build; claim area can be served more economically from existing mills

NEW ENGLAND'S metalworking industries feel like stepchildren when they go to buy steel. They long for their own hearths—in an integrated regional steel mill.

Why? Freight charges boost the price they pay for steel products as much as $10 a ton above that paid by their competitors located near the large steel mills to the south and west. The hardship imposed by the higher steel costs is causing some New England shops to consider moving out of the region to sites where they can escape the freight disadvantage.

But most of them would rather stay where they are—if they can obtain steel at a price that will enable them to remain competitive. That's why most of them look on the region's effort to obtain its own integrated steel mill with favor—sometimes with almost religious fervor.

12 Per Cent of Metalworking—New England boasts about 12 per cent of the country's total metalworking employment. Primary steel capacity located in these states amounts to scarcely more than one-half of 1 per cent of the country's total, or a little over 500,000 tons of ingots.

New England industrialists long have cherished the idea of a regional steel mill to supply a larger proportion of their requirements. The idea emerged into a program in 1946 when the New England Council authorized a study of the feasibility of such a mill. Discovery of large bodies of rich iron ores in Labrador and Quebec and in South America gave them great encouragement. Abandonment of the multiple basing point system of steel pricing and the cessation of freight absorption by steel producers in 1948 gave the project further impetus.

New London Proposed Site—Now the Council is energetically backing a proposal for an integrated mill of 1,250,000 tons capacity to be located at New London, Conn. But the difficulty lies in interesting an established operating steel company to participate in the project. A half dozen of the larger companies have turned thumbs down on the proposal, but the proponents still are hopeful.

Their problem and their hopes were outlined before the Joint Congressional Committee on the Economic Report during the hearing on the recent increase on steel prices. Their spokesman was Dr. Alfred C. Neal, vice president of the Federal Reserve Bank of Boston.

The Argument Pro

New Englanders look at the problem this way: Theirs is a deficit area as regards steel production. The region has only three mills with basic steel capacity, a total of a half-million tons. It has only one blast furnace and that now produces foundry iron.

Most metalworking companies must buy the bulk of their steel requirements from outside New England. The nearest large mills offering a diversity of products are those at Sparrows Point, Md., and Buffalo, N. Y. Steel consumers of New England must buy from these mills or mills even further away and pay the freight to their plants. At today's rates (see table), it costs $10.20 to haul steel from Sparrows Point to New Haven, Conn., and $12.60 to Manchester, N. H. From Buffalo to New Haven, the rate is $12.20, and to Manchester it is $12.60. From Pittsburgh the freight cost is even higher.

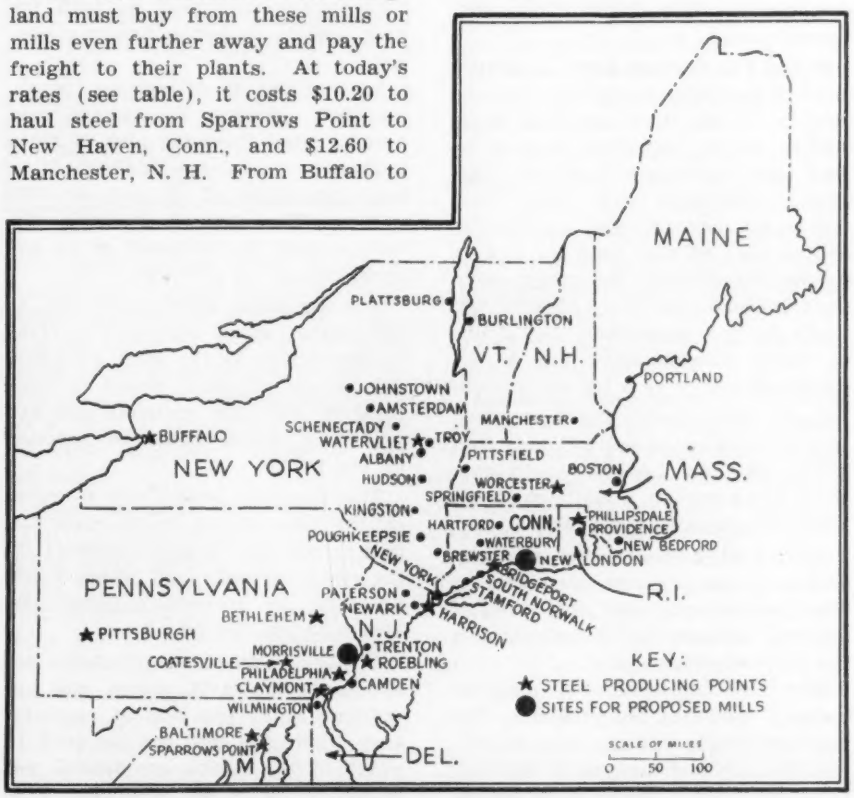
The effects of this cost handicap are keenly felt. One employer of 1500 says he is giving serious consideration to abandoning New England and moving to Ohio.

The manager of a plant employing 8000 says, "Now we're at the end of the line; we have to ship all our raw materials in, manufacture and then ship the products back."

Another company says any future expansion will be made in other parts of the country because of iron and steel costs.

Still another relatively small company figures that a New England mill would mean a saving of $1 million annually to it.

Adequate Market Claimed — New Englanders believe they have an adequate market for a 1,250,000-ton steel mill. They believe a mill located at New London could compete successfully not only in New England, but also in eastern New York, metropolitan New York and northern New Jersey. They also would have a try at the market along the Atlantic seaboard, shipping steel as back



MARKET FOR NEW ENGLAND MILL
. . . it's the colored area, proponents believe

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cargo in vessels bring southern raw materials to New England. They would take a shot at the Pacific Coast market and the overseas trade.

Here's how they figure the market. New England states used 867,000 tons of carbon flat-rolled products and bars in 1947, according to Census of Manufactures figures.

The eastern New York-northern New Jersey market accounted for about 1 million tons. Florida, Texas and the Pacific Coast took nearly 1.5 million tons. An additional market for silicon sheet and strip in and adjacent to New England is estimated at 100,000 tons yearly. Altogether, proponents of the proposed mill see a potential market for carbon and silicon steel of about 3.5 million tons.

Recognizing that one integrated mill cannot make all the products required by the region's steel consumers, the backers of the project propose to concentrate on flat-rolled products, carbon sheet, strip, plates that can be produced on a strip mill, and silicon sheet and strip. If these products would not take the total output of the primary facilities, they suggest that one or more bar mills should be added.

The council contends that freight rates (see table) would favor a New London mill in reaching all the New England market and also would provide an advantage to steel consumers in eastern New York and northern New Jersey, especially the rich metropolitan New York and Newark areas.

Would Use Foreign Ores—Development of the Labrador-Quebec iron ore field is looked upon by New Englanders as an important answer to their raw materials question. The Council estimates that these ores can be set down at New London for $5.70 a ton—cheaper than the cost of ore at Pittsburgh. But they don't want to wait until the Labrador ore starts flowing. Meanwhile they figure on using Newfoundland ore at an estimated cost of $6 a ton at the mill.

Coal, they admit, will cost more than at most inland mills. Coking coal landed at New London would cost about $10 a ton. It would come from West Virginia via Norfolk.

Both coal and ore, the project's backers argue, can be set down at New London at lower cost than if the two occurred in New England a few hundred miles apart.

The third important raw material —scrap—presents no problem. The region normally exports large quantities of scrap and the cost of this material at New London might be $7 to $10 less than at midwestern mills.

Limestone is available in New England and in New Brunswick, Canada, and could be delivered at a cost of about $2 a ton.

Iron and Steel Freight Rates

To	From Pittsburgh c/100 lbs	$/ton	From Sparrows Point, Md. c/100 lbs	$/ton	From Buffalo c/100 lbs	$/ton	From New London, Conn. c/100 lbs	$/ton
Bridgeport, Conn.	68	13.60	48	9.60	61	12.20	28	5.60
New Haven, Conn.	68	13.60	51	10.20	61	12.20	24	4.80
Springfield, Mass.	72	14.40	54	10.80	58	11.60	32	6.40
Worcester, Mass.	75	15.00	58	11.60	62	12.40	29	5.80
Providence, R. I.	76	15.20	61	12.20	67	13.40	25	5.00
Boston	76	15.20	62	12.40	63	12.60	34	6.80
Hartford, Conn.	70	14.00	53	10.60	61	12.20	25	5.00
Portland, Maine	80	16.00	70	14.00	70	14.00	44	8.80
Manchester, N. H.	76	15.20	63	12.60	63	12.60	40	8.00
Newark-Jersey City	62	12.40	42	8.40	58	11.60	40	8.00
New York City Lighterage	62	12.40	42	8.40	58	11.60	40	8.00

To	From Trenton, N. J. c/100 lbs	$/ton	From Roebling, N. J. c/100 lbs	$/ton	From Bethlehem, Pa. c/100 lbs	$/ton	From Coatesville, Pa. c/100 lbs	$/ton
Newark	18	3.60	20	4.00	25	5.00	34	6.80
New York City	24	4.80	25	5.00	29	5.80	34	6.80
Hartford, Conn.	42	8.40	42	8.40	43	8.60	46	9.20
Boston	52	10.40	54	10.80	53	10.60	57	11.40

Pig Iron for $24—The Council's steel committee estimates that by using raw materials from the sources and at the costs mentioned the proposed mill could produce pig iron at a cost of under $24 a ton.

Average cost of the finished steel products contemplated is estimated at $57 a ton.

Average realized price of these products is figured by the Council at $90 a ton.

Estimate Plant Cost at $240 Million—The Council estimates that a 1,250,000-ton mill could be built for $240 million, including working capital.

In an effort to attract an operating steel company, the Council proposes a novel financing plan. A state authority would be established to raise two-thirds of the cost, or $160 million. The Council believes the money could be borrowed at an average rate of 1¾ per cent.

The remaining third of the cost, or $80 million, would represent an equity investment by the steel company, $40 million of which would be supplied by the steel company and $40 million of which would be supplied by the public.

The company would pay a rental on the plant which would cover the interest on the money borrowed by the state authority and which would amortize the authority's investment over a 25-year period.

On the basis of the Council's assumptions on costs, prices, and operations at 82 per cent of capacity, they figure the mill for the first 10 years should make an annual net profit of $6,260,000 annually. This would give the stockholders a net return on investment of 7.8 per cent.

The Other Side

But operating steel men take a less optimistic view of the prospects for a New England mill. Their attitudes range from sterile approval to outright condemnation of the proposed plant as unsound.

Jones & Laughlin studied carefully the possibility of building a plant in New England and discussed the proposition at length with the New England Council. The company accepted the assumptions of the Council as to the availability of raw materials, the size of the market, and investigated the favorable financing arrangements offered by the project's backers.

"Under these conditions," says Ben Moreell, J&L head, "it might be assumed that a mill in New England could be built and operated at a profit. However, we believe such a profit would involve a greater risk and yield a lower return than we could obtain by investing our available funds in the modernization of our existing plants."

U. S. Steel Picks Trenton—United States Steel, which has 250,000 tons of ingot capacity at Worcester, Mass., plus extensive finishing mills, investigated the possibilities of building in New England.

Says President Ben Fairless: "After careful consideration of raw materials and markets in relation to plant locations, we concluded that if and when United States Steel constructs an integrated plant on the Atlantic seaboard, it should be located in the Philadelphia-Trenton-New York area."

Six weeks ago U. S. Steel acquired a 3800-acre site on the Delaware river, near Morrisville, Pa. (see map on page 55).

Should a New England steel plant

be constructed, Mr. Fairless says, U. S. Steel will be willing to supply it with iron ore. Presumably such ore would come from the corporation's new development in Venezuela.

Present Sources Cheaper—Existing steel plants can do a better job of supplying New England requirements and do it at a much lower cost to the consumer than could possibly be done by any new, relatively small integrated steel mill that might be constructed there today, says A. B. Homer, president, Bethlehem Steel Co.

Bethlehem has been the target for some pointed attacks by New England congressmen. At the price hearings, Mr. Homer objected to a charge by Sen. Brien McMahon (Dem., Conn.) that Bethlehem sells 67 per cent of the steel used in New England and thus dominates that market.

Actually, says Mr. Homer, Bethlehem shipped 523,000 tons of steel into New England in 1949, or about 26 per cent of the total used in that region. He says mills in Pittsburgh, Youngstown, Cleveland, Buffalo, Harrisburg, Conshohocken, Coatesville, Ivy Rock, Tonawanda and Claymont all compete actively in New England.

Questions Cost Estimates—Mr. Homer questions whether an integrated mill could be built for the Council's estimate of $180 a ton. He believes the cost would be between $200 and $250 a ton, depending on the nature of the finishing capacity.

He also questions whether a New England mill could average 82 per cent of capacity over the next ten years. European mills will have a surplus steelmaking capacity of about 8 million tons annually by 1953—and European steel already is being offered in Boston at $20 to $30 below the domestic price.

"It is inconceivable that any source of private capital would provide the funds required to construct even a small limited-product steelmaking and finishing mill in New England. If it is uneconomical from the standpoint of private capital, it is equally without merit from the standpoint of government funds," concludes Mr. Homer.

Border Competition

U. S. Steel's acquisition of a 3800-acre site for a new integrated mill near Morrisville, Pa., may prove a deterrent to the New England mill project.

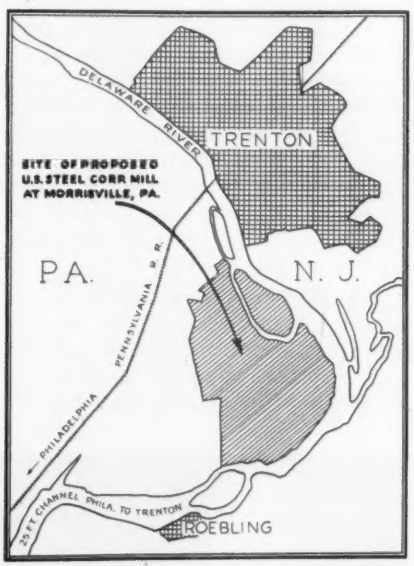
Although U. S. Steel says says it has no definite program for building the East Coast plant, many steel men believe the project will be started within the next 24 months and will be producing within four or five years. In part, these estimates are predicated on the belief that shipments of Venezuelan ore are expected to start in volume in about four years.

A mill shipping from Morrisville could offer substantial freight advantages to consumers in the big New York-Newark area. Although no freight rates are established for Morrisville, a fair indication of what they may be is indicated by the rates (see table) from Trenton, N. J., and Roebling, N. J., which bracket the new U. S. Steel mill site.

The rate from Trenton to Newark is $3.60 a ton and from Roebling to Newark $4 a ton. This compares with a rate of $8 from New London to Newark.

From Trenton to New York, the rate is $4.80 a ton and from Roebling $5 a ton, compared with a rate of $8 from New London to New York.

Steel men question how much of



the New York-New Jersey market a mill at New London could woo away from Bethlehem's Sparrows Point mill by virtue of a 40 cents a ton freight advantage. The advantage in freight rates that would be enjoyed by a mill at Morrisville jeopardizes the New Englanders' claim for this market.

Sparrows Point Expands—Bethlehem is adding 900,000 tons of flat-rolled steel capacity at Sparrows Point (STEEL, Jan. 30, p. 23) at a cost of $30 million, or slightly more than $30 per ton of finished steel. The low cost of the Bethlehem expansion, compared with the relatively high cost of an integrated mill in New England, may alter the projected competitive situation in the New York-New Jersey market. Bethlehem will bring in ingots from Steelton and Bethlehem, Pa.

Iron Ore in Pennsylvania?

Bethlehem Steel Co. has bought land in Berks county, Pa., to prospect for "possible deposits of ore."

The announcement followed reports of land purchases and test drilling near Morgantown, Pa., in the southern end of the county. A Bethlehem spokesman says:

"We are interested in prospecting in the general area of Morgantown and have acquired some land on which exploratory work is being done. This is a continuation of a general program of prospecting in the vicinity of former workings in this area for ore occurrences. The drilling to date has shown some ore, but nothing conclusive as to quantity or quality."

Bethlehem is reported to have bought in the past eight months 1500 acres at an estimated cost of $350,000. Prospectors are drilling deeper than in the past.

Cold Strip Price Rises

Nonintegrated cold-rollers raise base price to help offset higher costs of materials they buy

INCREASE in base price of cold-rolled strip steel produced by nonintegrated plants is resulting from rises in prices they have to pay for hot-rolled material from which to make the cold-rolled product. The increase, amounting to 25 cents a hundred pounds, pushes the cold-rolled strip base price of some producers to $4.40 per hundred pounds for 20 gage and heavier.

The steady narrowing of the price spread between hot-rolled sheets and cold-rolled strip in recent years has been of major concern to cold-rollers. Since 1944 13 gage hot-rolled sheets 16 inches wide has increased $35 a ton, while that of 0.020 inch thick cold-rolled strip 1⅛ inches wide has advanced only $27 a ton.

Earlier Increase Insufficient—Cold-rollers contend the original advance of 15 cents to $4.15 base was not sufficient to cover absorption of about $8 per ton increase in hot-rolled strip extras, or in those instances when sheets are purchased, an advance of $2 in base and $4 per ton in extras. Revised hot-rolled sheet extra card has combined the extras ranging from 15 to 35 cents for 8 through 13 gage in widths 12 to 15 inches, for example, into one gage bracket with an extra of 50 cents. This has resulted in higher costs to nonintegrated cold-rolled strip producers that purchase sheets and perform slitting operations.

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Price Hearings: Draw

Steel executives testify in hostile atmosphere. Congressmen hard to convince

CONGRESSMEN, labor representatives and steel men fished in cross currents at the Washington steel price hearings—and came up with nothing more remarkable than carp.

These five facts emerged from the investigation held by the Joint Congressional Committee on the Economic Report:

1. The steel executives who appeared had only one active friend among the numerous participating senators and representatives. He was Rep. Robert F. Rich (Rep., Pa.). All others were critical, if not downright hostile.

2. Most congressmen participating at the hearings continue to believe that prices should not have been increased in view of profits reported by the industry.

3. Some leading members of the committee who seized the opportunity to ride their pet theories revealed their thinking is actuated by prejudice or lack of factual data.

4. The diametrically opposite views about the industry's profits, as expressed by CIO spokesmen and industry executives, confused the congressmen and deepened the impression of dangerous disharmony between the two sides.

5. Committee members were impressed with the union charge that it was "sheer hypocrisy" for any steel company to claim that increased costs due to pension and insurance plans were responsible for recent price increases. They were impressed with the United Steelworkers-CIO 65-page exhibit that artfully admitted numerous informational gaps but still drew broad conclusions claimed to be fair and accurate.

Against Profits for Expansion — Most members of the committee disapprove of the extent to which profits are used by the steel industry to finance replacements. Nor does the committee approve any liberalization of the present depreciation allowance rate. Committee Chairman Joseph C. O'Mahoney thinks depreciation should be on the basis of the original investment in a plant rather than on the basis of present replacement costs.

Senator O'Mahoney defended his freight absorption bill "as the best piece of small business legislation introduced in Congress in a long time." Sen. Paul Douglas (Dem., Ill.) and Rep. Wright Patman (Dem., Tex.) led the opposition. The debates revealed that what Mr. Patman really wants is the protection of local plants from outside competition. If freight absorption is legalized, he says, the projected steel plant in New England "would not have a dog's chance because existing steel companies would absorb freight and put it out of business; you would get a legalized return of the old basing point system."

Profits Should Be 18 Per cent—Steel company executives' ideas as to a proper profit return were summed up by John R. Marshall, chairman, Granite City Steel Co. "A realistic profit in the steel industry would be 18 per cent, after taxes," he declared. "That would include 6 per cent for the shareholders and 12 per cent for replacement and modernization so that we can continue to compete."

Most forceful resentment over the price increases was expressed by Senator O'Mahoney. Ignoring entirely the normal business custom of getting as good a price for your commodity as your competitor, he said he was unable to understand why other steel companies followed the lead of the United States Steel Corp. in advancing prices. He thought it strange that Bethlehem Steel Co.—he was questioning its President A. B. Homer at the time—had not held to its former prices in order to undersell the competitor.

Still Higher Prices Needed—That was easy to answer, said Mr. Homer. The steel industry needs still higher prices but no company can advance if its competition does not advance; hence it was logical to follow the recent Steel Corporation increase. "Last year we raised prices because of our needs, but our competitor did not raise, so we later had to return to the old prices."

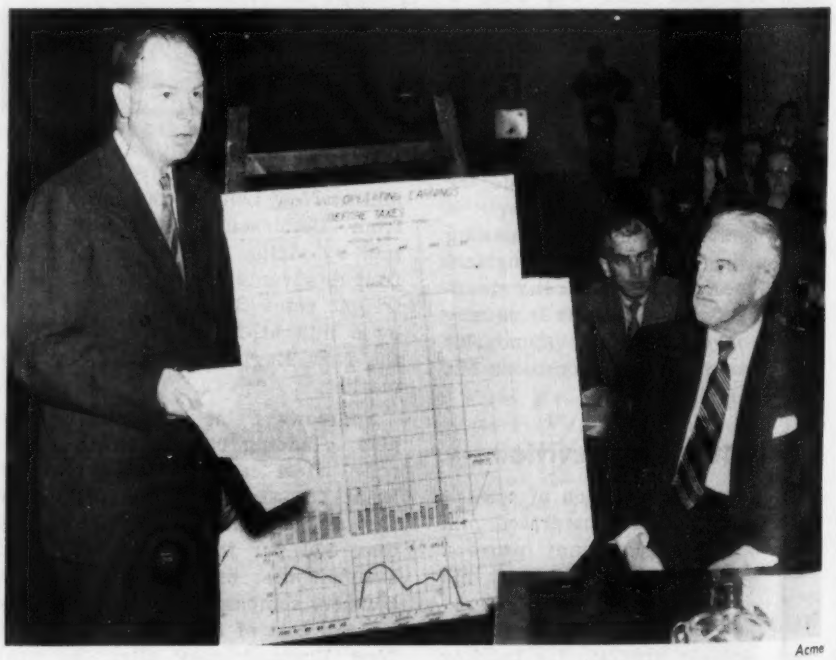
Rep. Emanuel Celler (Dem., N. Y.), chairman of the House Judiciary Committee, has postponed his group's hearings on the steel price increase until an indefinite date late in February.

Depreciation Needs Overhaul

A TREMENDOUS impetus could be given to industry by liberalizing plant and equipment depreciation rates—and it wouldn't cost the Treasury one cent in revenue. So says John W. Hanes, chairman, Tax Foundation Inc., and under-secretary of the treasury from 1938 to 1940.

Corporations should be permitted to set their own depreciation rates, with two limitations: The rates should be no higher than 20 per cent and corporations should stick to their schedules once they are established. The Treasury's present method of dealing with depreciation is "unsatisfactory," says Mr. Hanes.

"If a far-sighted policy is adopted," he says, "I will guarantee that the building expansion and renovation of plant in this country will be on a scale never before equaled. One drawback to such a policy is its immediate cost, as every $1 billion of extra depreciation means a temporary loss of $380 million in revenues."



Acme

"BY NO MEANS ENOUGH": E. J. Hanley, executive vice president of Allegheny Ludlum Steel Corp., in testifying before the Joint Congressional Economic Committee, said the recent steel price increase is by no means enough, that his company was considering a rise in the price of stainless steel

Steel Earnings: Some Up, Some Down

Country's two biggest producers of steel report 1949 net incomes above 1948, while other companies show declines for year marred by business recession and labor trouble

THE NATION'S two largest steel producers ran counter to the downtrend in steel company earnings in 1949 and made substantial gains over 1948. Their combined gains were so great they distort totals of earnings in the industry.

While six of the eight producers with fiscal years ending Dec. 31 and listed in the table below experienced declines in net earnings United States Steel Corp. and Bethlehem Steel Corp. each showed gains sufficient to make the total net earnings for the eight companies $398,362,895 in 1949, compared with $390,601,091 in 1948.

Gained in Three Quarters—U. S. Steel's 1949 net earnings of $165,958,806, a gain of $36,330,961 over 1948, were made despite the business recession of last summer and the steelworkers' strike of last fall. Those events helped reduce that producer's operations to 82.5 per cent of rated capacity in 1949, compared with 93.8 per cent in 1948. Both U. S. Steel's and Bethlehem's gains for the year were made by virtue of their operations in the first three quarters. Each of those companies earned more in each of the first three quarters of 1949 than in the corresponding periods of 1948 and made less in the fourth quarter of 1949 than in the like quarter of 1948. Each of the other producers listed in the accompanying table saw their 1949 fourth-quarter net earnings drop below those of the fourth quarter of 1948 too. One producer, in fact, had a net loss for the last quarter of 1949.

Only one producer shows a gain in the strike-affected fourth quarter of 1949 over the third quarter.

Of seven producers reporting sales figures all show declines for 1949 in comparison with 1948. The increase in aggregate net earnings, however, increases the 1949 average of net earnings to 7.2 cents per dollar of sales, compared with 6.3 cents in 1948. Sales of the seven producers total $5,397,567,041 for 1949, and $5,919,377,000 for 1948. Their net earnings total $390,466,630 for 1949 and $375,551,046 for 1948.

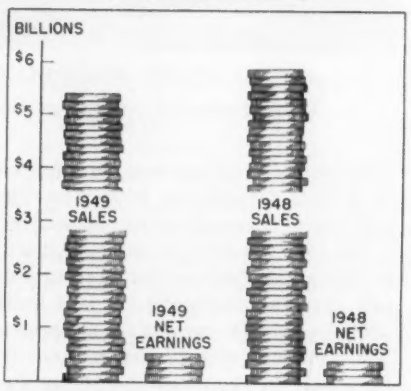
The decline in sales accompanied a drop in the nation's steel ingot production from 88.6 million net tons in 1948 to 77.8 million tons, the decrease reflecting last summer's business recession and last fall's strike of steelworkers. The industry's ingot producing operations averaged 81 per cent of capacity in 1949, compared with a 94.1 per cent rate in 1948.

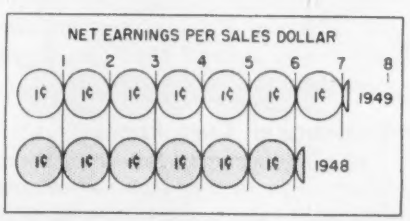
Adjustments Change Picture—U. S. Steel points out its net earnings for 1949 would have been less than they were had it not been for certain adjustments made in accounts because of the steel strike which began Oct. 1 and ended Nov. 12. These adjustments in accelerated depreciation and inventory accounts made it possible for the corporation to show fourth-quarter net earnings as $32.7 million rather than only $6.7 million.

Also helping U. S. Steel boost its net earnings were cuts in operating costs. It reduced its payroll expenditure by $104 million and its purchases of products and services by $107 million. Average number of employees in 1949 was 291,162, compared with 296,785 in 1948. Average for the fourth quarter of 1949 was 275,673.

Sales and Net Earnings

(Seven Steel Producers)





Steel Industry's 1949 Earnings Reflect Business Interruptions

	Year Ended Dec. 31		Fourth Qtr.	Third Qtr.	Fourth Qtr.
	1949	1948	1949	1949	1948
Bethlehem Steel Corp.	$99,283,539	$90,347,560	$16,385,137	$23,019,799	$37,163,702
Crucible Steel Co. of America	1,330,000	3,596,177			1,404,880
Inland Steel Co.	25,013,707	38,606,899	1,171,070	7,555,103	13,787,373
Jones & Laughlin Steel Corp.	20,961,245	31,222,451	922,327	4,870,019	10,973,134
Republic Steel Corp.	46,142,323	46,438,382	10,794,449	9,870,703	16,625,594
United States Steel Corp.	165,958,806	129,627,845	32,735,397	39,171,144	41,510,274
Wheeling Steel Corp.	7,896,265	15,050,045	381,968*	2,139,664	5,358,400
Youngstown Sheet & Tube Co.	31,777,010	35,711,732	3,219,019	7,514,626	12,372,402
Totals	$398,362,895	$390,601,091			
Steel Producers with Fiscal Years Ended at Dates Other than Dec. 31:	**Fiscal Years Ended in 1949**	**1948**	**Fourth Qtr. 1949**	**Third Qtr. 1949**	**Fourth Qtr. 1948**
§ A. M. Byers Co.	$1,724,223	$2,331,034	$393,013*	$138,324	$737,200
† Carpenter Steel Co.	2,008,952	1,553,783	517,007	217,783	656,616
† Colorado Fuel & Iron Corp.	10,182,919	6,181,777	823,004*	1,414,832	3,270,597
† Keystone Steel & Wire Co.	3,754,359	4,311,477	1,845,756	1,266,654	922,349
‡ Lukens Steel Co.	1,930,045	2,411,604			
# Northwestern Steel & Wire Co.	2,471,330	1,790,620			

* Net loss. § Year ended Sept. 30. † Year ended June 30. ‡ Years ended Oct. 29, 1949, and Oct. 30, 1948. # Year ended July 31.

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Coal Stocks Drop

But effect on industry not yet serious. Power shortages may hit metalworking

THE NATION'S coal stocks late last week averaged 20 days' supply. Bureau of Mines Director James Boyd calls a 25 days' supply "critical."

What's the effect on industry? Thus far, nothing serious because industry coal stocks generally are above the 20-day level. The worst shortages are in domestic supplies. Steel ingot output is off slightly but it's still comfortably above 90 per cent of capacity. Pig iron production is slipping more rapidly, but steel makers can boost the scrap charge in open hearths if necessary. Scrap is plentiful and relatively cheap.

First serious difficulties for metalworking companies may come in their power supplies. Duquesne Power & Light Co. is operating on a curtailed basis in the Pittsburgh area. Eastern utility industry executives say brownouts and factory shutdowns are likely by the end of February if the coal miners don't return to the pits on at least a three-day-week by then.

An estimated 21,000 steel and railroad workers have been furloughed because of the coal strike. Latest layoff was by Baltimore & Ohio Railroad which sent 3800 shopworkers home, late last week.

THE PITCH IN THE COAL SITUATION NEA

. . . even discarded screenings from an old carbon mine are being used

Poor Purchasing Censored

As a nation we are doing a very poor job of purchasing. We are not getting our money's worth, says George A. Renard, executive secretary-treasurer, National Association of Purchasing Agents.

"We are destroying the only thing that can make this a dynamic, expanding economy—the free market," says Mr. Renard.

Purchasing men find two items currently in short supply—steel and coal. In the months ahead, he believes, steel prices may be forced down. Supply and demand played no part in the steel price increase which was caused by imposition of pensions on the industry.

Prospects for 1950 are good and total production should be as great as in 1949, he believes, with the high point to be reached in first half.

SP Orders 3100 Freight Cars

Southern Pacific has placed orders for 3100 new freight cars. This will bring to 23,630 the total number of new cars acquired by the railroad since the end of the war, in addition to a half interest in 8000 new Pacific Fruit Express refrigerator cars.

The new orders just announced will be divided as follows: Pullman Standard Car Manufacturing Co. will build 2000 50-ton box cars at its Bessemer, Ala., plant; 1000 50-ton automobile cars will be built by Southern Pacific's Sacramento shops; and 100 70-ton drop end gondolas will be constructed by Ralston Steel Car Co. at Columbus, O.

Studebaker Cuts Prices

Prices going up? Not all of them. Competitive factors and cost-cutting programs have enabled these three to pare prices: Studebaker Corp., Bohn Aluminum & Brass Corp. and Rockwood Mfg. Co. Inc.

The highest production volume on record and lowered unit costs realized from production economies permitted Studebaker to reduce prices of all passenger cars from $82 to $135, effective Feb. 1. The 1949 output topped all previous marks, bettering 1948 by 43 per cent. Production for the past five months has been 67 per cent over the same period a year ago. The company has just completed a $60 million plant expansion and modernization program.

Bohn, a Detroit maker of automotive parts, has adopted a new pricing policy whereby it is discontinuing all volume discounts to jobbers. At the same time it is making a general 5 per cent reduction in its regular prices to jobbers.

Rockwood, an Indianapolis manufacturer of v-belt pulleys, has cut prices from $0.50 to $3 per sheave.

FRB Report Optimistic

Industrial production expanded rapidly in December and continued to increase in the first half of January, Federal Reserve Board says.

The board's index of industrial production stood at 178 per cent of the 1935-1939 average for December, a 5-point gain over November. At 178 the index had climbed just halfway back from the low point of the 1949 recession reached last July, towards the postwar peak of November, 1948.

Gas Appliance Sales To Rise

Sales of gas appliances in 1950 should far exceed those for 1949, E. Carl Sorby, vice president, George D. Roper Corp., believes. He reasons that no part of the country is beyond economical reach of natural gas from Texas and also cites the tremendous growth of the liquefied gas industry which makes potential customers of people located beyond reach of city gas mains.

Features of gas appliances which must be stressed are their automaticity, their controllability and their ease of maintenance.

Castings Orders Hold

Industrial orders for castings are holding up much better than new railroad business at General Steel Castings Corp., Granite City, Ill. General Steel makes heavy castings used in steam turbines for central power plants built by both General Electric Co. and Westinghouse Electric Corp.

Backlog at present includes cast-

ings for 66 passenger cars for the Great Northern Railroad—the largest passenger car order for some time. The company does not make castings for freight cars.

Company's operations in recent months have been hit by reduced railroad ordering of locomotives and passenger cars. Its two plants at Granite City and Eddystone, Pa., are producing between 2000 and 25,000 tons a month, about half the production at this time last year. Backlogs now are sufficient so that both plants can operate at a reduced rate for six months. Net income last year was an estimated $2.1 million, compared with $3.7 million in 1948.

Buyers See Good Business

Buyers report good business in January, says National Association of Purchasing Agents.

Production gains are at a higher rate than in December. Order backlogs, though still of a conservative short range, are keeping pace with production increases. The price structure is creeping up, mostly attributed to steel. Industrial inventories show no marked change but show the strongest trend to increase since last October. Employment is back to the September level. Buying policy continues within a 90-day commitment range, with 74 per cent maintaining a 60-day coverage.

More California Jobless

Unemployment is still increasing in California and has reached the point where approximately one out of every ten working people is jobless.

The latest official report, covering employment in December, shows that 409,000 persons, or 9.1 per cent of the state's total labor force of 4,482,000, were unemployed at the end of the year. The jobless total has expanded since that time. Unemployment in December was estimated to be 82,000 greater than in December, 1948.

A large part of the current unemployment reflects cutbacks in agricultural work. Manufacturing employment is also showing a downtrend. The situation is intensified by a continued heavy migration of workers to California from other states.

Bankers Optimistic

Bankers are optimistic about business prospects for the first half of 1950.

A survey by the Credit Policy Committee of the American Bankers Association shows that bankers base their opinion on the strong consumer demand for industrial products. Coupled with this is the fact that business is expanding its plants and is not overextending inventories.

GE Unit Gets U. S. Contract

New orders totaling more than $30 million for navigational computers and gunsights have been awarded AC Spark Plug Division of General Motors Corp. by Air Materiel Command of the U. S. Air Force.

The instruments will be produced in AC's Milwaukee plant. With these contracts, AC's order backlog is sufficient to keep the plant at capacity production well into 1951.

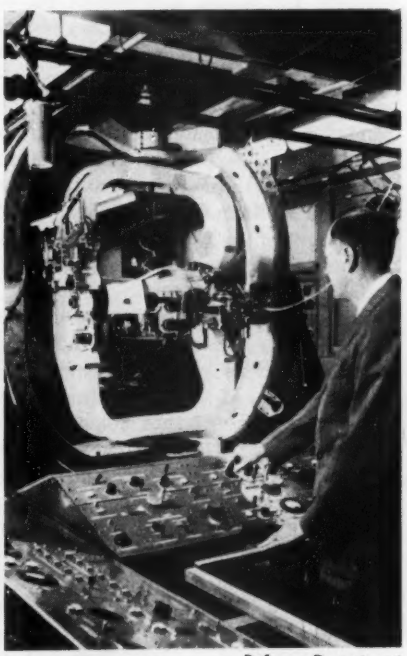
Renewal Parts Center Started

NEW, STREAMLINED Renewal Parts Center for faster delivery of Westinghouse appliance parts to distributors was established in a 125,000-sq ft, two-story plant at Newark, O., by Westinghouse Electric Corp.

Pettibone Mulliken Buys J & J

A 70-YEAR-OLD Chicago concern, Pettibone Mulliken Corp., purchased Johnston & Jennings Co., Cleveland.

Included in the sale are J & J's Oceco Division and its vent valves, flame arrestors, gages, swing lines and other tank equipment. The entire finished inventory of Oceco products and all work in process were moved to Pettibone Mulliken's 30-acre Chicago plant. The company will be known as the Johnston & Jennings Co. Division of Pettibone Mulliken Corp.



Defense Department

"FLIGHT TEST" BY CALCULATOR: Massachusetts Institute of Technology engineers built a calculating machine to flight test an airplane before it is constructed. The flight simulator involves intricate computers and a gimbal "flight" table that orients the automatic controls of a theoretical plane or missile just as it would be tested in actual flight

Round Chain & Mfg. Co. Formed

FORMATION of a new Round Associate Chain company with headquarters in Chicago is announced by James W. Dickey, vice president and treasurer.

The new concern will be known as Round Chain & Mfg. Co. It will be directly affiliated with the five other Round Chain plants which produce industrial, marine, railway, automotive, building, home and farm chain of every type.

Milwaukee Warehouse Sold

COLUMBIA Steel & Shafting Co., Carnegie, Pa., sold the Milwaukee warehouse of Edgar T. Ward's Sons Co. Division to Central Steel & Wire Co., Chicago.

E. L. Parker, president, Columbia Steel & Shafting Co., states that the sale of the Milwaukee warehouse, operated by his company for the past 21 years, is due to increased cost of operations resulting especially from high transportation charges. Cold-finished bars sold by the Milwaukee outlet have been manufactured in Pittsburgh and shipped to Milwaukee.

U.K. Labor's Chances Are Even

BRITAIN'S Labor government has a 50-50 chance for re-election, says Brig. Gen. William H. Wilbur, speaker at the annual meeting of the Steel Plate Fabricators Association in Chicago.

The number of people on government payrolls assures a labor vote of 6 to 8 million, the general believes. The public is surprisingly apathetic about politics, which should favor the incumbents. Many independent voters may disapprove of Labor policies, but they also disapprove of Winston Churchill as prime minister. Countering these factors: The considerable strength of the Conservatives; growing resentment even in labor rank and file against totalitarian acts of the government.

During the two-day meeting J. E. O'Leary, Pittsburgh Des Moines Steel Co., Pittsburgh, was re-elected president of the association. Vice president is R. J. Ryan, John Nooter Boiler Works Co., St. Louis; treasurer is William S. Wheeler, Pennsylvania Engineering Corp., New Castle, Pa.; secretary is J. Dwight Evans; and executive director is Tom R. Wyles.

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Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

A substantial water education program that promises to be stepped up to crusade proportions is underway. If you use a lot of water, it may pay you to re-examine your operations

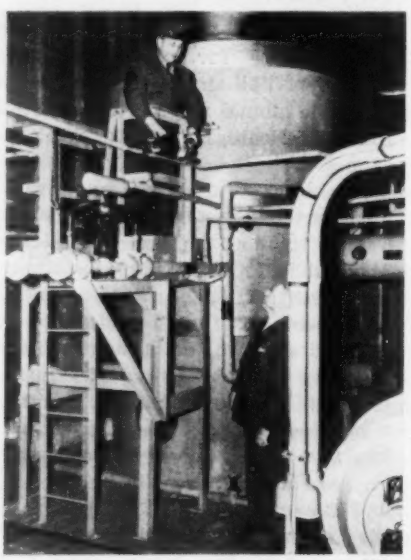
MANUFACTURERS using water in large quantities should re-examine their operations. A substantial water educational program is under way—in schools, women's clubs, sportsmen's organizations, etc.—and it promises to be stepped up to the proportions of a crusade. It takes no imagination to foresee a time in the not distant future when an industry that uses water wastefully or pollutes it needlessly with industrial wastes will be as popular as a skunk at a May party.

Heading the drive—of course—is the federal government. It's moving in three ways:

1. The President has appointed a Temporary Water Resources Commission to outline a national policy.

2. The Geological Survey is replacing its piecemeal approach to an all-out study of our water resources to ascertain how much water we have, where it is available, how it is being utilized and where it is used unintelligently or wastefully.

3. The United States Public Health Service is inviting representatives of outstanding water using industries to join a Technical Task Committee to stimulate research on methods of disposing of industrial wastes that now are drained off into our streams, and to help outline a plan for spending federal aid money most effectively in fighting pollution.



NEA

NATION'S BIGGEST DISTILLERY: Final tests were given this distillery for making salt water potable. Its cost: $80,000. It takes dirty salt water and purifies it at a 1250-gallon-per-hour clip. The plant is to be dismantled and shipped to Bermuda for use by the Air Force. The project's engineer is far from optimistic about the use of such plants for New York city

Personnel of the new Temporary Water Resources Commission will not spare the horses in cracking the whip over industries that use water wastefully or pollute it. Chairman is Morris L. Cooke, Philadelphia consulting engineer. Other members are Leland Olds, former member of the Federal Power Commission; R. R. Renne, president, Montana State College; Louis W. Jones, president, University of Arkansas; Samuel B. Morris, Los Angeles Department of Water and Power; Gilbert White, president, Haverford College; Paul S. Burgess, dean, College of Agriculture, University of Arizona.

In the Interior Department a new concept on water use seems to be formulating, particularly regarding irrigation. Experience shows that use of salt-bearing river water in the course of years ruins low-lying lands: Large formerly fertile areas in Florida, Texas and some other states have become impregnated with salt and no longer grow crops. This study promises to bring changes in population trends that will have big marketing significance.

An Interior Department spokesman has this word of advice for industry: "Manufacturers contemplating the construction of new plants should take a new factor into consideration in selecting a site. They should study the availability of water, just as they have been considering the availability of raw materials, labor, transportation and markets."

Geological Survey will conduct a census of water use and what kinds, and how much, of industrial wastes run off with the water returned to lakes and streams. Preliminary figures indicate the following water consumption, in gallons, for manufacture of 1 ton of each of the following products: Bromine 5,000,000, magnesium from sea water 300,000, synthetic rubber 600,000, soap 500, smokeless powder 50,000, viscous rayon 200,000. In making by-product coke 3000 gallons of water are needed for a ton of coal.

Pending in Congress are two bills aimed to solve the water problem. One is an O'Mahoney bill to set up a federal aid program for developing processes for converting sea water into fresh water. The other would permit manufacturers to deduct from their income taxes—over a 5-year period, the cost of antipollution facilities.

Bourbon and Water

A SCHOLARLY HISTORY of the effects of unintelligent use of water, prepared by the Geological Survey, attributes the universal drinking of wine in France, Italy and other European countries to the fact that widespread pollution in those countries has for many centuries rendered the waters unfit for human consumption.

The situation must not be allowed to get that bad in the United States, says an administration water official. "Bourbon here is preferred to wine," says he, "and at present prices we just could not afford to make that the national drink."

Shipbuilding May Get Early Vote

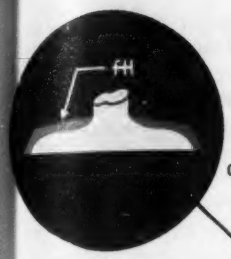
DESPITE the President's condemnation of pending proposals to encourage shipbuilding by more liberal subsidy payments, backers of this legislation in both houses propose to bring the measure to early vote.

The Bland bill, H. R. 5346, is on the House Union calendar and a rule will be asked for it soon. The O'Conor-Magnuson bill, S. 2786, will be subjected to hearings by the Senate Interstate and Foreign Commerce Committee starting Feb. 14.

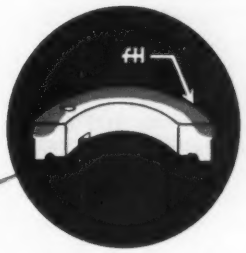
The Senate bill is the same as the House bill except that it would permit accelerated depreciation up to 15 per cent annually on new ships; the House bill sets a maximum of 10 per cent.

Both of the measures would apply the construction-differential subsidy, now granted only on new vessels operated with subsidy assistance in designated trade routes, to all new vessels built for U. S. foreign commerce. Liability of the buyer of a vessel in both bills is limited to a first mortgage on the vessel.

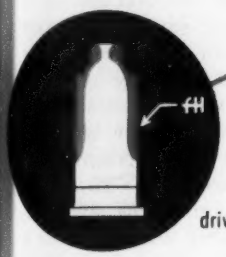
"I am seriously concerned," said the President, "by the increasing



oil pump valve



clutch adjusting nut



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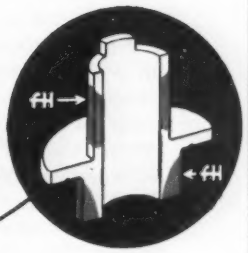

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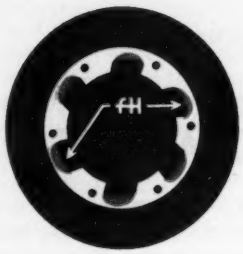

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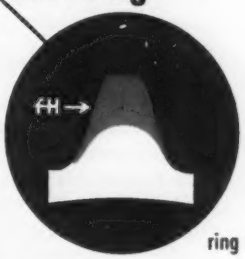
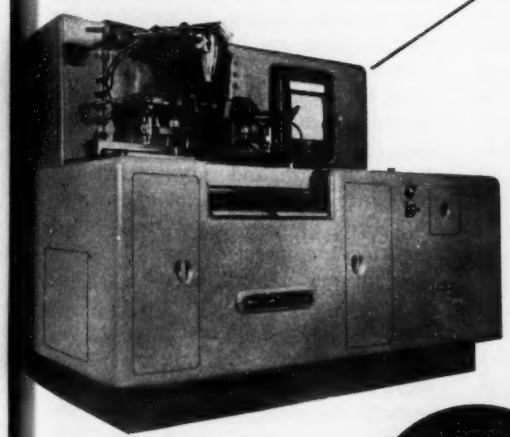


ring gear



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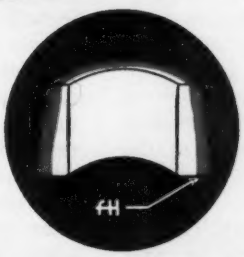

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cost of these existing (operating and construction) subsidies and by the potential cost of new subsidies now being advocated." General Philip B. Fleming, Maritime Commission chairman, thinks a 60 per cent construction subsidy now is necessary to close the gap between American and foreign shipbuilding costs instead of the present allowable maximum of 50 per cent.

Western Shipbuilders Seek Aid

GOVERNMENT assistance to keep the West Coast shipbuilding industry from completely dying out is urged by shipbuilding employers and unions.

No new vessels have been produced in West Coast yards for the last three years, and other ship activity gradually is dwindling. The West Coast during the war turned out a majority of wartime ships.

At the start of 1948, 20,900 workers were employed in West Coast yards. But by the start of 1949 employment was down to 12,800 and at the start of 1950 the number had slumped to 3200.

Specific proposals to stimulate activity are:

That Congress approve $25 million for overhauling 134 merchant vessels now in the Maritime reserve fleet.

That in distribution of this repair work, as well as other repair work and new construction, the West Coast yards be given an equitable share of the business.

Selling to Government?

BECAUSE of misunderstandings of many companies wanting to sell to the government, Federal Supply Service points out that the first step to be taken by the bidder is to supply full and detailed information about products on which he desires to bid.

Such information should be sent to F. G. Moyer, Room 7282, Seventh and D streets S. W., Washington 25. Once a supplier's name has been entered, he is automatically assured that he will receive invitations to bid on openings that he is interested in.

Denham Assails Decisions

UNDISMAYED by increasing labor union pressure at the White House that he be dismissed from his post, Robert N. Denham, general counsel, National Labor Relations Board, continues to assail the board for issuing pro-labor decisions in anticipation of repeal of the Taft-Hartley Act.

He has advised building trade employers in New York not to accept NLRB decisions as final but to appeal them to the courts. But even court decisions do not stop the board, he went on, as "we (Mr. Denham and his staff] and the courts have been reversed so many times by the board that I'm beginning to wonder."

Last Monday Mr. Denham, speaking before the American Trucking Associations Inc., in Washington, accused the board of condoning secondary boycotts prohibited by the Taft-Hartley Act. One of the board's latest decisions permits inclusion of employers' names in a union's unfair list.

"If such publication," said Mr. Denham, "has the effect of causing other people to cease doing business with the person whose name has been published, or causes employees to refuse to handle his goods, that is simply one of the incidents of such publication of its (the union's) notice of the primary dispute, that stands in the same category as a picket line in front of his place of business."

Mr. Denham sharply criticized the board's decision in the Schultz Refrigerated Service case. In it the trucking company, whose headquarters are in New Jersey, got in trouble with the teamsters' union in making deliveries in New York city. The Schultz truck was regarded by the board as the company's place of business, and the cab of the truck as the employment place of the driver; so the New York teamsters' union did not violate the secondary boycott ban when its members followed the Schultz truck and set up picket lines wherever it stopped for deliveries.

Although Mr. Denham was appointed by the President for a four-year term expiring Dec. 16, 1951, the CIO general counsel says the President has the power to fire him.

Pass the Ammunition

LEADING congressional Republicans are convinced that in the President's budget report they have good ammunition for the 1950 election battles.

The voters, they say, have finally become aroused all over the country over the prodigal spending program demanded by the administration, with the alternative choice of piling up new deficits or increasing the already heavy tax load. To spearhead the fight against the spenders, the House leadership has appointed a new "Price Tag" committee, headed by Rep. John Taber (Rep., N. Y.) and comprised of 21 Republican members of the House. Its purpose is to keep the public advised on the true cost of administration-proposed legislation.

CAPITAL COMPASS

HELPING SMALL BUSINESS is what Scott W. Lucas, Senate majority leader, had in mind in drafting a bill that would give Reconstruction Finance Corp. broad new powers to encourage long-term loans. RFC loans now are tied closely to the security that the borrower can offer, but Senator Lucas' measure would authorize RFC to make advances on: A company's past and prospective earnings and its record for management skill . . . Taxation of income would be limited by constitutional amendment under a resolution by Sen. William F. Knowland (Rep., Calif.). The amendment would read: "Except during the period of hostilities in any war during which the United States is a belligerent, the Congress shall not lay or collect any tax on taxable income at an effective rate in excess of 50 per cent of such income." Ratification by three-fourths of the states within seven years would be required, of course . . .

Assurances by the Defense Department that it is not seeking to move industries from coast to inland locations for security reasons have not registered with many of the congressmen from coastal areas. S.2916, by Sen. Warren G. Magnusson (Dem., Wash.), would require advance review by the National Security Resources Board of proposed military procurement contracts involving any switch from one area to another . . . Latest bill to amend the antitrust laws to cover labor unions — S.2912, introduced by Sen. A. Willis Robertson (Dem., Va.)—aims at depriving "labor leaders and labor unions" of the power of "unreasonably restraining trade to any extent their whims dictate, including control of production and prices." . . . .

Look for extension of the Selective Service Act in substantially its present form beyond the present June 24 expiration date. The only question is will the draft powers be invoked simply by proclamation by the President of a state of emergency or will a joint congressional resolution be required. Otherwise the draft machinery is to be preserved, including the "draft industry" powers in Section 18 under which the President may seize plants and operate them, and under which steel company officials may be penalized up to three years and fines up to $50,000 for noncompliance with government priority orders.

Oh, Mr. Lewis! Europe's Coal Output Up

Increasing output abroad isn't helping John L. Lewis' contract drive as U. S. coal exports slide. Declining demand for American bituminous contributes to his troubles

GREATER coal production in Europe isn't helping John L. Lewis one bit. Declining demand for U. S. bituminous is one of the factors contributing to his troubles. Better domestic output in Europe is one of the big reasons why there is less need for American-mined fuel.

U. S. coal exports—most of it goes to Europe — have been declining steadily since 1947. In that year an average of 5.7 million net tons were shipped overseas per month; 3.8 million tons per month in 1948; and 2.5 million tons per month for the first ten months of 1949. Average shipments abroad in 1938 were 966,000 tons per month.

Where is the coal coming from in Western Europe? The four big producers — United Kingdom, Western Germany, France-Saar and Belgium in that order—are now mining about 9,275,000 tons per week, 15 per cent above the 1948 level and only 5 per cent below the 1938 production level. If Western Germany were excluded, current output of the other three nations would be 2 per cent above the 1938 rate. Production in Western Europe has increased mainly because of greater mechanization.

Absenteeism Plagues U. K.

British miners are digging coal at the rate of 4,880,000 tons per week, 9 per cent more than the weekly average for 1948 and 0.5 per cent more than the 1938 average.

The coal mining occupation may breed the same kind of worker the world over for in Britain there is a coal labor problem somewhat like that in America. In Britain it has taken the form of individual absenteeism. When a miner has earned enough to cover expenses, it is common practice for him to knock off for the rest of the week or month. Absenteeism in 1949 was double that of 1938.

That is one reason why British coal prices have risen 148 per cent since 1938, more than for any other important raw material or finished product. Average commodity price increase since 1938 has been 133 per cent. Steel has gone up 85 per cent, but this would have been much less had it not been for the large coal boosts. The steel industry uses 550,000 tons of coal a week.

Steel prices may rise more soon because of higher freight rates. That's bad because British export quotations are being undercut in some instances. More than 30 per cent of the industry's entire output goes for direct exports or for indirect use in other export goods. Record steel production of 17,419,248 tons in 1949 should be exceeded by 275,000 tons in 1950, British Iron & Steel Federation says. Demand for steel is still high, and much of the production is allocated.

Automakers need more steel, but aren't likely to get it in 1950. Last November this industry exported 28,000 cars and 9000 trucks and busses, the highest in history. The total includes nearly 1400 vehicles for the U. S. Ford Motor Co. Ltd. of England will retool for two new types of passenger cars, a truck engine and a heavy tractor. The company will finance $9 million of the project; ECA will supply $4.5 million more. While the program is essentially one for replacement and modernization, retooling should make possible an increase in output of about 10 per cent. Production will continue at the present rate until the end of 1951 when a new strip mill will begin operations.

Another large steel consumer is the electrical equipment industry which is heavily booked for power generation and transmission apparatus. Demand for electricity is still far more than the nationalized power industry can supply.

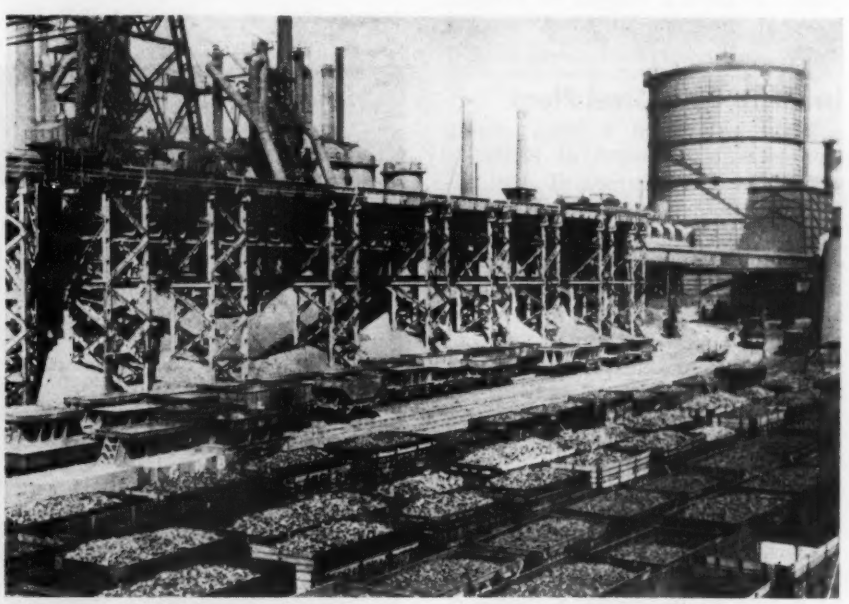
Uniscan, a limited financial union of Britain, Sweden, Norway and Denmark, was born in Paris Jan. 30 at a meeting of the ERP countries. A broader customs union was vetoed by Norway's objections. The most important provision of the accord—a provision that all but Norway put into effect immediately—was to take off the limits on tourist spending among the four countries. The union includes 10 other proposals still to be acted upon. Among those are relaxation of controls on movement of capital, freeing of blocked balances except in the case of Norway, a more liberal attitude toward credit and increased opportunities for the Scandinavians to use their sterling credit outside the sterling area.

Ruhr Mine Output Off

Weakest link in Europe's coal production chain is the Ruhr. That area is the second largest producer in Western Europe. It mines 2,310,000 tons weekly, 27 per cent more than the 1948 weekly average, but 25 per cent less than the 1938 rate.

The coal industry is reviving, but it still has a long way to go. The U. K., France and Belgium are mechanizing their mines as much as possible. Not nearly as much modernization is going on in Germany. Ruhr industrialists fear they will be hopelessly outdated by 1952 when many mechanization programs in other countries are scheduled for completion. Already demand for Germany's coking coal has dropped significantly because France is extending her coking coal capacities.

German builders of coal mining equipment are doing well. Their



COAL, COKE, GAS: Iron, steel and gas plants standing on adjacent sites of this plant in South Wales reveal the interdependency of heavy industries. Gas producing plants (background) fire the furnaces of iron and steel mills. The coke by-product of gas lies in trainloads on the sidings

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largest orders are from France and Benelux. Ironically, most Ruhr coal producers can't afford even the German equipment, although there are some domestic sales.

France Mechanizes Coal

Third largest coal producer is France-Saar which is mining about 1,430,000 tons weekly, 22 per cent more than in 1948 and 13 per cent more than in 1938.

France is mechanizing her coal mines more than any other nation in Western Europe. In 1948 and 1949 she spent a total of more than $533 million on equipment and miners' housing. The program is now 60 per cent completed, and will be all finished by 1952. Over the past two years about 75 per cent of the modernization was financed by ECA funds. Coal production in 1949 hit 58.3 million tons, only slightly below the alltime records in 1929 and 1930 of 60.5 million tons. Target output for 1952 is 66 million tons.

Less Coal in Belgium

Declining coal production in Belgium parallels the nation's slipping economic position. Belgians are mining 585,000 tons weekly, about the same as the 1948 output, but 7 per cent below 1938 levels.

Unemployment is up and foreign trade is down. The most disturbing point is the unfavorable trade balance with the U. S. Before the war, only 9 per cent of Belgium's imports were made from America, now the figure is 19 per cent. It's the reverse for exports to the U. S.; 7 per cent of the total in 1936-1938 and less than 4 per cent by the end of last year. Belgium's answer is a high-powered program to boost exports to the U. S.

Israel To Build Steel Plant

Israel will build a steel rolling mill seven miles north of Haifa. It will produce 60,000 tons of steel annually, including 14,000 tons of tube rounds, 5000 tons of electrically welded skelp, 15,000 tons of structural shapes, 16,500 tons of reinforcing bars and 9000 tons of wire rod. H. A. Brassert & Co., New York, is consultant to the operator, Solel Boneh Ltd. The company is already in the construction, cement, glass, brick and foundry industries; a newly formed division, Israel Rolling Mills Ltd., will operate the mill. European-produced billets will be used at the plant.

Electrical apparatus, rolling mill rolls, cranes and small auxiliaries will be purchased in the U. S. Some of the mill equipment has already been bought, from European military authorities who had seized it during the war.

Specialty Steel

Being made by Wallingford in Connecticut. Can roll 60,000 tons of strip per year

MORE specialty steel—and better in quality—is being made in New England because of Wallingford Steel Co.'s $1.5 million expansion and modernization program. The company now can cold-roll 60,000 tons of strip annually at Wallingford, Conn.

Major items of new equipment include a bright annealing furnace, a continuous normalizing furnace, a redesigned breakdown mill with supplemental machinery, wet and dry grinders and slitting apparatus.

Annealing Furnace—The bright annealing furnace, a hydrogen atmosphere unit designed by Electric Furnace Co., Salem, O., can anneal cold-reduced steel in widths up to 15 inches and in gages from 0.005 to 0.060-inch at 1200 pounds per hour. The continuous normalizing furnace will anneal two 27-inch strips from coils, with gages 0.009 to 0.125-inch, at a three-ton-per-hour rate. Coils up to 15,000 pounds can be handled.

Wallingford's main 29-inch breakdown mill has been redesigned for increased speed and tension, mainly through improved payoff and takeup facilities. Changes have been made in the mill drive and electrical controls that permit handling of coils weighing 15,000 pounds instead of 8000 pounds formerly. Additional rolling mill facilities supplementing the redesigned main breakdown unit include a two-stand, four-high tandem mill. This is capable of cold-reducing 14-inch stainless and 18-inch carbon strip at speeds up to 800 fpm from 0.160 to 0.010-inch in coils running 500 pounds to the inch of width. Replacing a former 18-inch planishing mill is a two-high unit that can handle 27-inch material in 15,000-pound coils. Wallingford also has new slitting equipment, including a McKay cutting machine.

Grinding Practice Better — Strip grinding practice has been improved by installation of a Hamilton Pump wet grinder. With three stands, this equipment makes three grinds on each side in one pass. A new Hill Acme dry grinder has also been added. This is a tandem installation, grinding strip up to 27 inches twice in one pass.

Wallingford also began production of electric welded mechanical and ornamental tubing.

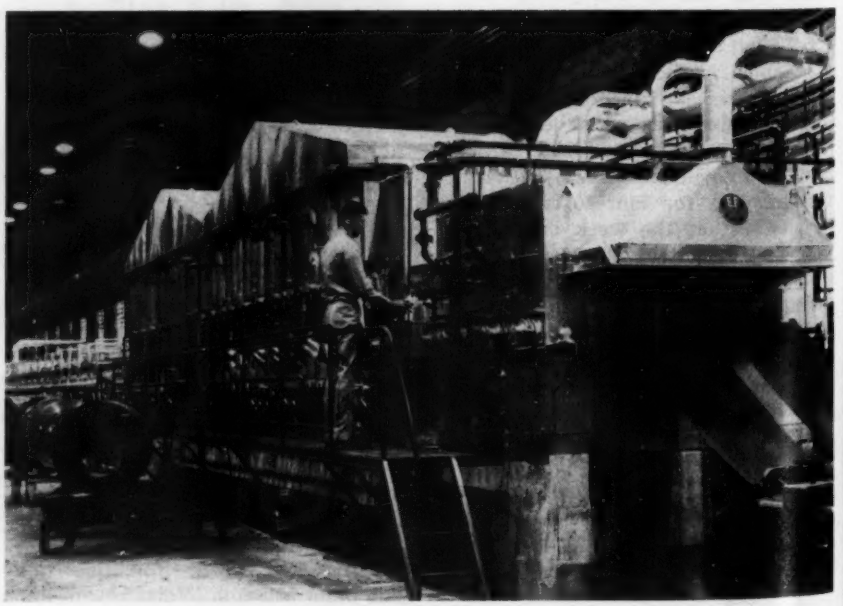
Standard Buys Hersey Division

STANDARD STEEL Corp., Los Angeles, fabricator of heavy steel plate, made an outright purchase of the Drying Machinery Division of Hersey Mfg. Co., Boston.

Standard for many years has made drying and dehydration equipment for chemicals, fertilizers and by-products. Robert S. Burns, president of Standard, says Hersey was established in 1859, and the original patent for rotary drying was obtained by Charles S. Hersey in 1871. The dryer division of Standard is an outgrowth of the old Pioneer Boiler Works of Los Angeles. It was established before World War I.

Plans for 1950 call for manufacturing in the East and in the main plant in Los Angeles. Key personnel of the acquired organization are to be retained.

Winthrop P. Hersey, vice president



WALLINGFORD'S CONTINUOUS NORMALIZING FURNACE
. . . handling two 27-inch coils at a 3-ton-per-hour rate

and general manager of Hersey Mfg., says the Dryer Division of the company had become foreign to its main business of manufacturing water meters and allied accessories.

Canada To Make Stainless Sheet

CANADA will start its own stainless steel sheet industry this year when Atlas Steels Ltd. installs the first stainless sheet rolling mills in the country at Welland, Ont. Production should start next September.

"Rising steel prices in the U. S., the Canadian import duty, transportation costs, Canadian excise taxes and the 10 per cent devaluation of our dollar dictate the move," says R. H. Davis, Atlas president. Now Canada imports about 2500 tons of stainless sheet a year from the United States, 90 per cent of its needs. The rest comes from Great Britain.

Atlas already produces stainless steel in bar, rod and wire forms, among other specialty steel products, and stocks them in warehouses through Canada. When production permits, it will warehouse the stainless sheets.

The equipment to be erected at Welland will permit production of sheets in hot-rolled, pickled and annealed condition. Two polishing machines will be installed to polish sheets in widths up to 48 inches wide. Later, production plans call for cold-rolled finishes.

Superior Developed Process

SUPERIOR STEEL Corp., Pittsburgh, C. I. Collins, president, points out, developed the method of rolling copper clad steel fabricated into bullet jacket caps that was erroneously attributed to McLouth Steel Corp., Detroit and Trenton, Mich., in the Jan. 23 issue of STEEL, p. 38. McLouth was a Superior licensee.

Test Packaging Before Shipping

"PLEASE give the Safe Transit Program the consideration to which it is clearly entitled. By no means has the task been accomplished."

That was the plea made by Lewis Pilcher, executive vice chairman, Freight Claim Division, Association of American Railroads, in an open letter to shippers of finished metal products who have not yet adopted the National Safe Transit Program.

Claims on appliances and sanitary ware rose 48 per cent—to a total of $6.7 million in a single year (1948), Mr. Pilcher says. There were times when more articles were held for repair parts than went to sales. The answer of the industry's leaders to this problem was the National Safe Transit Committee, sponsored by the Porcelain Enamel Institute, Washington.

"Based on extensive knowledge gained over the years, this program shows manufacturers how they can stop in-transit damage losses before they occur—by testing the packaged product in the factory to make sure it will withstand the risk of damage common to all forms of transportation and handling before and after shipment," says Mr. Pilcher.

Nail Machine Business Sold

OHIO Electric Mfg. Co., Cleveland, bought the nail making machine business of Black Industries Inc., same city.

Black has been a large producer of wire nail making machines. Ohio Electric is taking over all business on hand and will continue delivery of machines and spare parts to Black's former customers.

Auction Sale of Tools, Equipment

INDUSTRIAL PLANTS Corp. is selling at public auction this week the tools and equipment of Lindahl Foundry Co., 5900 Ogden Ave., Chicago.

Some 160-odd tools to be sold at the sale include a 100-inch Betts boring mill, several 54-inch Bullard mills, some Newark, Gould & Eberhardt and Barber-Colman hobbing machines and some Gleason bevel equipment. Details of the sale can be obtained from Miss R. C. Becker at the Ogden street address.

Lukens Electrifies Mill

LUKENS Steel Co.'s twin-tandem steam engine, power source for the Lukens 206-inch mill, is dead. It was nearly 32 years old.

Born May 22, 1918, the engine produced 10.5 billion pounds of steam in its life, to keep the mill turning out approximately 3,750,000 tons of steel plates. Successor to the steam engine will be electrical equipment, expected to be operating the 206-inch mill by April.

Hardware Men Elect Officers

HARDWARE Merchants' & Manufacturers' Association of Philadelphia has elected these officers for 1950: President, Edward J. Weierstall, North Bros. Mfg. Co., Philadelphia; vice president, Edward K. Tryon III, Edward K. Tryon Co., Philadelphia; secretary-treasurer, Thomas A. Fernley Jr., Philadelphia.

CALENDAR OF MEETINGS

Feb. 7-9, Ohio Hardware Association: Exposition, Public Auditorium, Cleveland. Association headquarters are at 175 S. High St., Columbus, O.

Feb. 9-10, American Foundrymen's Society, Birmingham Chapter: Regional conference Birmingham. Society headquarters are at 222 W. Adams St., Chicago.

Feb. 9-10, American Foundrymen's Society, Wisconsin Chapter: Regional conference, Schroeder Hotel, Milwaukee. Society headquarters are at 222 W. Adams St., Chicago.

Feb. 9-11, Society of Plastics Engineers: Meeting, Hotel Cleveland, Cleveland.

Feb. 12-16, American Institute of Mining & Metallurgical Engineers: General Meeting, Hotel Statler, New York. Institute headquarters are at 29 W. 39th St., New York.

Feb. 13-14, Society of the Plastics Industry (Canada): Canadian annual meeting. Royal York Hotel, Toronto, Ont. The Canadian segment of the society is associated with the American society whose headquarters are at 295 Madison Ave., New York.

Feb. 13-15, American Management Association: Conference on employee relations and personnel administration, Palmer House, Chicago. Association headquarters are at 330 W. 42nd St., New York.

Feb. 14-16, Purchasing Agents Association of Chicago: Products show, Hotel Sherman, Chicago. Association headquarters are at 134 N. La Salle St., Chicago.

Feb. 15-16, American Hot Dip Galvanizers Association Inc.: Annual meeting, Netherland Plaza Hotel, Cincinnati. Association headquarters are at 2311 First National Bank Bldg., Pittsburgh.

Feb. 15-17, American Chemical Society: Pittsburgh conference on analytical chemistry and applied spectroscopy. Hotel William Penn, Pittsburgh. Society headquarters are at 60 E. 42nd St., New York.

Feb. 20-21, American Material Handling Society, Indianapolis Chapter: Materials handling conference sponsored jointly with Purdue University, at Lafayette, Ind.

Feb. 24, Eastern States Blast Furnace and Coke Oven Association: Meeting, Hotel William Penn, Pittsburgh.

Feb. 24, Malleable Founders' Society: Western sectional meeting, Drake Hotel, Chicago. Society headquarters are in the Union Commerce Bldg., Cleveland.

Feb. 27-Mar. 3, American Society for Testing Materials: Committee week and spring meeting, Hotel William Penn, Pittsburgh. Society headquarters are at 1916 Race St., Philadelphia.

Feb. 28-Mar. 1, Chamber of Commerce of the United States: National marketing conference, Hotel Book-Cadillac, Detroit. Chamber headquarters are at 1615 H St., Washington.

Mar. 2-4, Society of the Plastics Industry, Pacific Coast Section: Annual conference, Hotel Del Coronado, San Diego, Calif. Society headquarters are at 295 Madison Ave., New York.

Mar. 3, Malleable Founders' Society: Eastern sectional meeting, Hotel Commodore, New York. Society headquarters are in the Union Commerce Bldg., Cleveland.

Mar. 8, American Society for Testing Materials, Philadelphia District: Meeting on air pollution, Philadelphia. Society headquarters are at 1916 Race St., Philadelphia.

Mar. 10-11, American Foundrymen's Society, Ohio Chapters: Regional conference, Cincinnati. Society headquarters are at 222 W. Adams St., Chicago.

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Make each ton of steel go farther. Get four products in place of three from the same amount of steel. Let the high physical properties of N-A-X HIGH-TENSILE take the place of mass in your product design to boost production per ton as much as 33%. This new efficiency in the use of steel is part of industry's constant search for better materials.

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Thus you can redesign many steel products with sections 25% thinner—to save weight, save steel. And further savings in fabricating and finishing pay the way to use of this better, more efficient material.

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N-A-X HIGH-TENSILE STEEL

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Builds More Products per Ton

MAKE A TON OF SHEET STEEL GO FARTHER
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By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Process Development Section at General Motors takes the strain out of new ideas before tossing them to production departments. Case histories show progress

DETROIT

DIVISIONAL engineering autonomy and the competitive huff-puffing in the General Motors family was referred to here last week as a distinctive feature of the corporation's activities. However, there is an overall linkage between engineering and manufacturing, relatively new, which has grown to robust size while paying off handsomely. That is the Process Development Section, currently occupying 90,000 sq ft of rented floor space at the Cadillac plant. Its functioning was detailed recently to the Society of Automotive Engineers by R. J. Emmert, executive in charge of the GM facilities and processes staff.

Before too long the section will be transferred to the corporation's new technical center now abuilding in Detroit's northeast area. Basically what it does is to take ideas proposed by research and product study engineers, or by plant personnel in the various divisions, work out the costs and possible cost savings, develop the method, demonstrate the process and then toss the ball to the divisions.

Six Goals—Early in the PDS program it was discovered shop supervision generally was too busy getting out production schedules to concentrate long enough on ideas to build them into production caliber. New methods study had to be removed from production areas and carefully babied until they proved workable in the shop. Six goals eventually became discernible. As listed by Mr. Emmert, they are:

1. To develop better ways of manufacturing products—improve quality, reduce cost and improve working conditions.

2. To develop a group of engineers capable of working out some of the more baffling problems arising in applying new ideas to manufacturing processes, with the ultimate aim of training young engineers who can be placed in manufacturing divisions on this type of work.

3. To prove ideas on a productive scale in the project shop so there is no doubt they can be used in plants without serious introductory difficulties.

4. To seek the best that is being done in any one plant and determine how to apply these systems to other plants.

5. To establish sufficient confidence in the PDS so that divisional engineers will bring problems to it.

6. To be successful enough to break down the reluctance of individuals to make changes, and to persuade both product engineers and manufacturing people to accept and utilize the best of the know-how.

Parts Polished Quicker—Case histories of progress realized thus far are numerous. Mr. Emmert related a few. One involved the polishing of parts such as die-cast hardware or steel stampings in a revolving tub of slightly abrasive "mud." Ternstedt Division was polishing small irregular shaped hardware parts with unusual success, so PDS decided to see what it could do. A single-spindle machine was built with a revolving tub and work-holding fixtures which could be moved angularly to present all sides of the part to the action of the mud. It was large enough to handle stampings used in grille and bumper assemblies and could put a slick polish on a steel part in 15 seconds.

Auto, Truck Output

U. S. and Canada

	1950	1949
January	620,000*	445,092
February		443,734
March		543,711
April		569,728
May		508,101
June		623,689
July		604,351
August		678,092
September		657,078
October		601,021
November		474,726
December		378,834
Total		6,528,157

Weekly Estimates

Week Ended	1950	1949
Jan. 14	154,552	112,587
Jan. 21	158,432	113,820
Jan. 28	139,500	116,471
Feb. 4	130,000	102,981

Estimates by Ward's Automotive Reports

* Preliminary.

Meanwhile, GM research engineers had found they could chrome plate a part having an originally smooth surface, without any intermediate buffing or polishing of the base copper plate. The method involves expensive changes in present plating equipment and solutions, but one GM division is already using the system in regular production. An essential is to have the original steel with scratch-free surface, and that is where the mud polishing equipment comes in. Belt polishing machines have been installed in several plants to finish steel in the flat, eliminating considerable hand polishing, but it is still necessary to buff the copper plate. PDS wants to go all the way—polish the part as it comes from the last press operation and then copper-nickel-chrome it without further handling.

The boys are not there yet, although they have received an order from one division for a four-station machine to copper buff grille bars by the mud method, and they are working on another machine to polish the steel first to permit plating with no buffing. The four-station, two-tub indexing-type machine has an indicated production of 450 pieces per hour, as fast as an operator can handle the parts.

Show Savings Possible—Comprehensive study and research by the PDS staff uncovered possible savings of $500,000 annually if all corporation plants changed from chilled iron and malleable iron shot to cut wire shot in blast cleaning and peening operations. SAE 1065 hard drawn spring wire, chopped off by a milling cutter, ran 1670 cycles in a shot testing machine, against 41 cycles for malleable and 10½ for chilled iron. Current usage of shot runs to 8000 tons annually at a cost of $990,000, figuring in actual consumption, productive labor, power, maintenance labor and maintenance material. Practicability of using cut wire shot in the cleaning of castings has yet to be fully proved, because of excessive carryout, although improvements in machine equipment would appear likely to correct this difficulty. The Cadillac foundry is using the wire shot in one of its cleaning machines and has reduced shot consumption by 49 per cent and cleaning cost per part by more than 16 per cent.

Even more startling are results on peening of front wheel springs with cut wire shot. Without shot peen-

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ing, springs formed from fine ground steel bars will average about 170,000 cycles of compression. Conventional shot peening boosted this to 700,000 cycles and permitted specification of less highly finished bars. Steel shot pushed fatigue life to 4.5 million cycles, or about the limit of the test machine measurement.

Mr. Emmert's limited review of typical projects coming under the probing eyes of PDS was striking testimony to the effectiveness, cost-wise and quality wise, of the section's work.

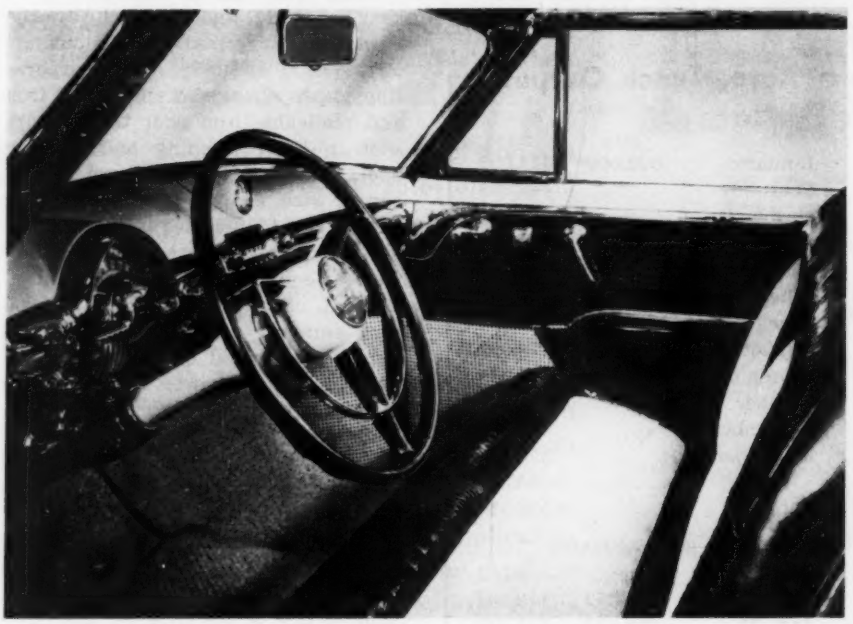
Long Strike Probable

MAKING hay while Chrysler divisions are still paralyzed in the iron clamp of a UAW-CIO strike which shows no signs of loosening, General Motors, Ford and some of the independents continue to put the whip to production schedules, adding extra shifts, scheduling some Saturday operations and otherwise extending output. Chrysler looks to be girding for a long drawn-out battle. Union heads reportedly have instructed idle workers to seek other jobs or, in the case of migratory workers, to go back home. Bus terminals report travel southward has tripled since the start of the walkout Jan. 25.

No negotiations are in process. Federal and state mediators say the situation looks gloomy. One after the other of leading Chrysler suppliers has instituted layoffs and the jobless total could easily reach 150,000. Pickets are making sporadic appearances at Chrysler plants, and there have been some instances of attempts to interfere with admission of office workers' union. Leaders of the UAW say there is no need for mass picketing because the union has grown up in the last dozen years. It is now smart enough to win a strike without picketing or violence.

The union approach, says Frank Rising of the Automotive Parts Manufacturers, is beginning to look a bit like fakery. He reports last Nov. 15 the Union International Board quietly agreed to a new contract with one of the largest parts manufacturers, without pension, with a moratorium on pension discussions for 2½ years, with no general wage increase, with substantially improved insurance benefits and finally a moratorium on further insurance talks for 4½ years. Also a promise of secrecy was extracted. On top of that last week he says union headquarters called off negotiations with numerous small and medium-sized companies in the Detroit area, telling the locals to stand by for further orders. This may refer to companies holding contracts with the east-side local of the UAW which for years have followed the "pattern" set by Chrysler.

This is the fourth major strike the UAW has pulled at Chrysler plants. The first was in 1937, lasting 32 days, the second in 1939, lasting 54 days, and the third in 1948, lasting 17 days.



ONE FOR THE SHOW: The driver's compartment of the special 1950 Oldsmobile "98" Holiday coupe—the Palm Beach—shows rich green alligator leather trim on the door panel and edging the seat cushions. Lacquered panels in yellow wicker are on the lower door panel. The floor mat is finished in natural flax. The exterior is painted surf green with a cabana sand top. Windows are actuated by hydraulic power and fingertips. The car was made especially for show purposes

For Smoother Traveling

OWNERS of 1950 model passenger cars are riding on a cushion of 94 to 143 lb of rubber, depending on the make involved.

Today rubber goes into weatherstrip for windshields and windows, floor mats, dust seals, accelerator, clutch and brake pedals, arm rests, windshield wipers, body shims, motor mounts, fan belt, radiator and heater hose, brake lines, wire insulation, battery boxes, lamp gaskets and seats, or 350-400 parts in all, weighing 70-100 lb. Tires and tubes range from 24-43 lb.

Twenty-five years ago, Goodyear put down a stretch of roadway of natural rubber blocks in front of its home offices in Akron. It shows little deterioration today but the expense of solid blocks was too much to make it practical. However, by mixing natural or synthetic rubber with asphalt, an excellent resurfacing material can be provided, showing less tendency to bleed in hot or wet weather, as well as a decrease in brittleness in cold weather. A 5 per cent mixture of rubber with conventional asphalt, applied at an average thickness of 1½ inches on a 24 ft highway, adds about $1000 per mile to installation costs. They are offset by greatly reduced maintenance costs and longer life, as indicated by careful inspection of test strips laid in Holland before the war.

Curvaceous

WINDSHIELDS of the new Kaiser 1951 models are designed with a sweeping curved top line dipping at the center, suggestive of the upper extremity of a strapless evening gown. In fact, Kaiser stylists call it a "sweetheart curve," fashioned with "nature's most beautiful curve" in mind. It is a touch supplied by Howard Darrin, consulting stylist for the model.

Ford Workers Get Checks

EIGHTY-THREE special check writing machines have been installed by Ford to write the 106,000 weekly paychecks for hourly rated employees who formerly were paid in cash twice a month. The machines are designed so the operator has only to record the base wage, overtime or premium pay and deductions. A single control then figures the net wage and writes the check.

Take a look at something wonderful YOU CAN'T SEE!

When you examine and admire the new models at the winter shows, you'll see many of the devices that make automobiles so dependable today. But not all of them!

You can't see the amazingly accurate New Departure ball bearings beneath the gleaming chrome and lacquer of the new cars. Located where they are, by engineers who perform new "miracles" each year, these *ball* bearings carry the loads, lick wear and friction, and keep moving parts moving, precisely in position, for years and years.

New Departure, world's largest maker of ball bearings, welcomes the increasing acceptance by engineers of the fact that "nothing rolls like a ball."

nothing rolls like a ball...

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Hotpoint Building

New refrigerator factory and home laundry plant to match other appliance production

HOTPOINT INC. will erect a new refrigerator factory on a 21-acre site in Chicago.

President James J. Nance also says tooling and machine installations to complete conversion of the company's range plant for manufacture of home laundry equipment would be completed during the year. (The range plant is across the street from the refrigerator factory site.) The refrigerator plant is slated for completion sometime in the late summer of 1951. At present Hotpoint refrigerator components are made by General Electric.

The two moves are the final phase of the company's postwar expansion program: Investment in plants, machinery and operating capital totaled $70 million. The home laundry and refrigerator plants are estimated to cost about $12 million each when fully equipped. Hotpoint's expansion program—it's the largest in the industry—has more than tripled the company's output. The company—upon completion of the two projects—will have refrigerator and home laundry facilities to match present production of electric ranges, dishwashers and its other major appliances.

Seven Plants—It has seven midwestern plants with 3 million sq ft of manufacturing space for production of 12 major electrical appliances for complete kitchens, home laundries and commercial cooking equipment. Total employment is about 9000; about 3000 will be added to the payroll when production of refrigerators is underway; capacity of the plant is to be about 8000 units per week.

Hotpoint's home laundry equipment was placed on the market a year ago, but complete conversion of specialized tooling was held back until the present.

Centralized in Midwest — The refrigerator plant will occupy a site procured immediately after the war when the company acquired several large plots in the Chicago area for its long-term development program. When all the moves are complete, all Hotpoint facilities for manufacture of electrical appliances will be centralized in the Midwest. All units will be produced in company-operated plants.

Houghton Now in Manufacturing

ENTRY into the manufacturing field is announced by Houghton Laboratories Inc., located in Olean, N. Y.

Formerly a consultant on protective coatings and corrosion control, Houghton is manufacturing a series of new anticorrosive metal primers and surface coatings and a new plastic material called Hysol 6000.

Hysol coatings are used for protecting steel storage tanks, refinery equipment, electroplating racks, oil pipes, chemical equipment, instrument cases, furniture, ships and other marine equipment. Hysol 6000 is a new insulating material that is being used as insulation in television sets, knife handles, wire coatings and piping for chemical industries.

Stolper Steel Menomonee Bound

STOLPER Steel Products Corp. will move from Milwaukee to Menomonee Falls, Wis. when its new one-story plant is completed sometime before the yearend.

The 42-year-old firm, employing 350 persons, manufactures a wide assortment of custom-fabricated sheet metal parts and assemblies largely for automotive, agricultural and industrial uses.

Water supplies that caused the company to end consideration of other sites in Milwaukee are adequate in Menomonee Falls. They're needed to cool resistance welders used in fabrication of the sheet metal parts.

Baldwin Opens New Storeroom

NEW STOREROOM that will enable Baldwin Locomotive Works to offer more direct service on replacement parts to customers in Texas and Louisiana was opened by Baldwin in Houston.

Some 1500 separate items of diesel engine and locomotive parts will be stocked for customers who were formerly served from St. Louis.

W & H Takes Over O.K.

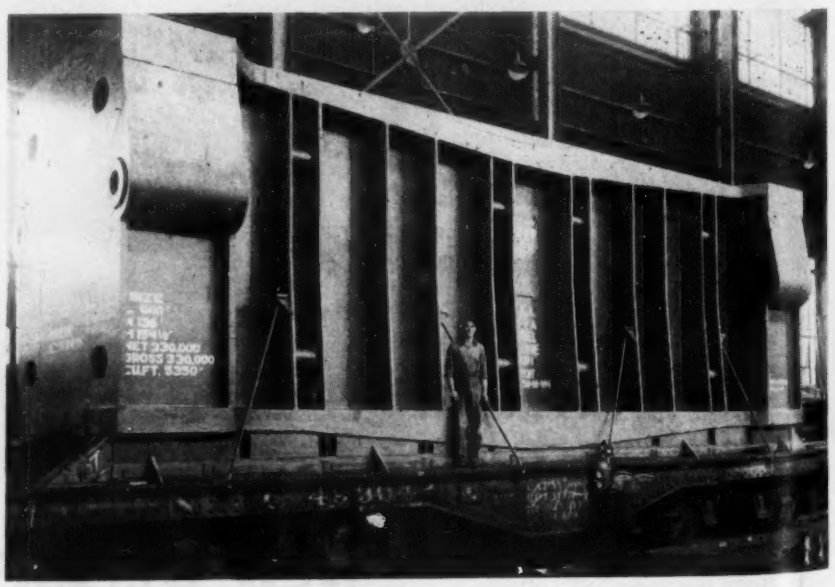
ALL OPERATIONS of O. K. Tool Co. at Shelton, Conn., ceased last month and are being carried on by Williams & Hussey Machine Co., Wilton, N. H.

The tool company, purchased by Williams & Hussey in 1949, was established in 1901. It will retain its identity and operate as a division of the Wilton firm. Williams & Hussey is exclusively owned and operated by Thurston Williams and Forrest Hussey. The new owners of O. K Tool will invest $200,000 in new machinery.

GE Ready "Right Now"

GENERAL ELECTRIC Co.'s Aircraft Gas Turbine Divisions are ready "right now" to take orders for jet engines for commercial transport use.

C. W. LaPierre, manager, told the New England Aviation Writers that GE's TG-190 turbo jet could meet power plant needs for the first American jet transport model. He believes landing and communication delays—regarded by some as obstacles to successful jet transport operations—can be overcome with technological developments now available or in process of development.



BIGGER ONE YET TO COME: A huge metal forming press, 38 feet long and weighing 750 tons, was completed by Clearing Machine Corp., Chicago. The bed, pictured here, is loaded aboard a 16-wheel railroad car. It weighs 175 tons. The bed can receive dies 84 x 350 inches long. Already the company is at work on a larger one that will go to a Texas plant

Briefs . . . .

Ironton Firebrick Co., Ironton, O., appointed Robbins & Bohr, Chattanooga, Tenn., Tennessee representative.

—o—

Diamond Alkali Co., Cleveland, put into full-scale operation a new 500,000-ton furnace at its Cincinnati silicate plant. It will increase output of silicate of soda and related products by 50 per cent. Expansion can be attributed to the growing demand for silica gel catalyst in the oil industry.

—o—

Stover Lock Nut & Machinery Corp., Easton, Pa., bought a new and larger plant in that town. All operations are being conducted in the new plant where the firm manufactures the patented Stover lock nut and other types of special and common nuts.

—o—

R. D. Wood Co., Philadelphia, named E. V. Prentice Co., Portland, Oreg., exclusive Pacific Northwest sales agent. Wood is a manufacturer of hydraulic presses for the plywood, hardboard, plastics, rubber and metalworking industries.

—o—

Paul Blum Co., Buffalo, was set up by Paul Blum, formerly manager of the Chemical and Ferrosilicon department of Alan D. Oppenheimer Inc. Blum handles industrial chemicals and by-products.

—o—

Rust Engineering Co., Pittsburgh, will build a new 150-ton-per-day soda recovery plant to serve the Johnsonburg, Pa., paper mill of New York & Pennsylvania Co.

—o—

Cutler-Hammer Inc., Milwaukee electrical manufacturer, opened a sales office in Dayton, O. It will handle motor control and allied electrical apparatus in the Dayton area.

—o—

Bridgeport Brass Co., Bridgeport, Conn., opened a new district sales office in Dallas. It will handle sale of all Bridgeport mill products, plumbing brass goods, copper water tube and pipe.

—o—

Top bid of $117,500 for the **Harvey Mfg. Co. Farm Implement Division** plant, Racine, Wis., was refused by the board of directors. Production machinery, tools and machine shop housed in the plant were sold at auction. Factory space, says H. R. Mandel, president, is available for lease to local industry, two adjoining buildings have 78,000 sq ft of space. The plant was sold after Harvey discontinued producing farm equipment.

Master Builders Co. put its new $500,000 plant in Buffalo into operation. It produces granulated iron coatings.

—o—

Fred J. Fleming, vice president of **Excel Metal Cabinet Co.,** Falconer, N. Y., bought controlling interest in the firm from Armot & Co., Baltimore.

—o—

The **American Car & Foundry Co.** plant in Buffalo has been put on the market for lease or sale. It has been idle since 1945 when war work was completed. Land and buildings are assessed for more than $800,000.

—o—

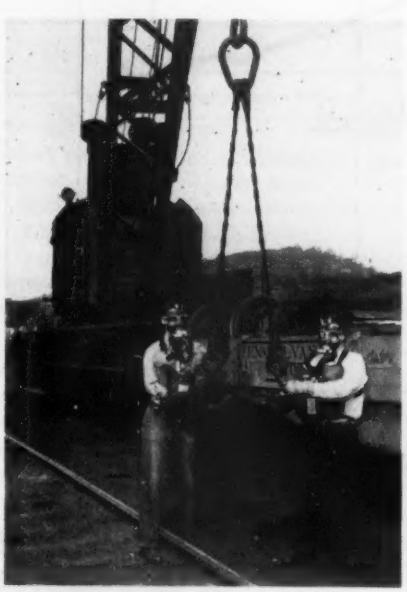
Allis-Chalmers Mfg. Co., Milwaukee, named Drill Master Supply Co., Evansville, Ind., dealer for Allis-Chalmers motors, controls, centrifugal pumps, transformers and circuit breakers in portions of Indiana and Kentucky.

—o—

C. I. Crais Co.—sales agent for **Lukens Steel Co.** and its divisions, **By-Products Steel Co.** and **Lukenweld,** Coatesville, Pa.—is now in Birmingham. Crais moved from New Orleans. In its new location it will serve Lukens customers in Arkansas, Florida, Georgia, Louisiana, Mississippi and South Carolina.

—o—

Kaiser Steel Corp. opened a sales office in Houston to handle the company's sales of steel line pipe in the Southwest.



TAKING A BREATHER: Crews of Pennsylvania Railroad wreck trains have been trained in the use of a new type oxygen breathing apparatus to aid them in emergency work. Developed by Mine Safety Appliances Co., Pittsburgh, the apparatus generates its own oxygen, providing 45 minutes of protection in unbreathable atmosphere

—o—

Midwest Industrial Truck & Supply Co., Chicago, took over sales of Moto-Trucs in Illinois.

—o—

Royal Metal Mfg. Co., Chicago—commercial metal furniture—will re-enter the export market this spring. Irving Grombacher, president, sailed from San Francisco to investigate the export situation in the Philippine Islands. Chairman of the Board Irving Salomon went on extended trip to South America, Africa, the Middle East and France.

—o—

United States Radium Corp., New York, increased its engineering and plant facilities for design and manufacture of etched and lithographed name plates for machinery, motors, instruments and other equipment. The company also produces luminous dials for watches, clocks and other instruments.

—o—

Metalwash Machinery Corp., formerly of Irvington, N. J., opened its new plant in Elizabeth, N. J. With improved facilities the company can produce its industrial washing machines, dryers, pickling machines, quench tanks and draw furnaces, bakery pan and rack washing machines, pot washers and special machinery at an increased rate.

—o—

R. Y. Ferner Co., Boston—machines for fatigue testing of materials—established a new department for engineering and sales of a new line of portable hardness testing instruments. For the first time the company has these machines available for prompt shipment. Two of the principal instruments, one for the dynamic and one for the static method of testing metals and plastics, are described in literature sent on request.

—o—

Loewy Construction Co. Inc., New York, got a contract from the Industrial Planning Division of the Air Materiel Command for installation of heavy die forging presses, portions of equipment removed from German war plants as part of war reparations. Loewy will erect the presses in AMC's Adrian, Mich., Manufacturing Methods Pilot Plant.

—o—

Scovill Mfg. Co., Waterbury, Conn., built a new brass mill products depot containing expanded sales offices in Chicago. The depot is laid out for straight-line-flow of materials from incoming rail shipments to outgoing deliveries to Scovill customers.

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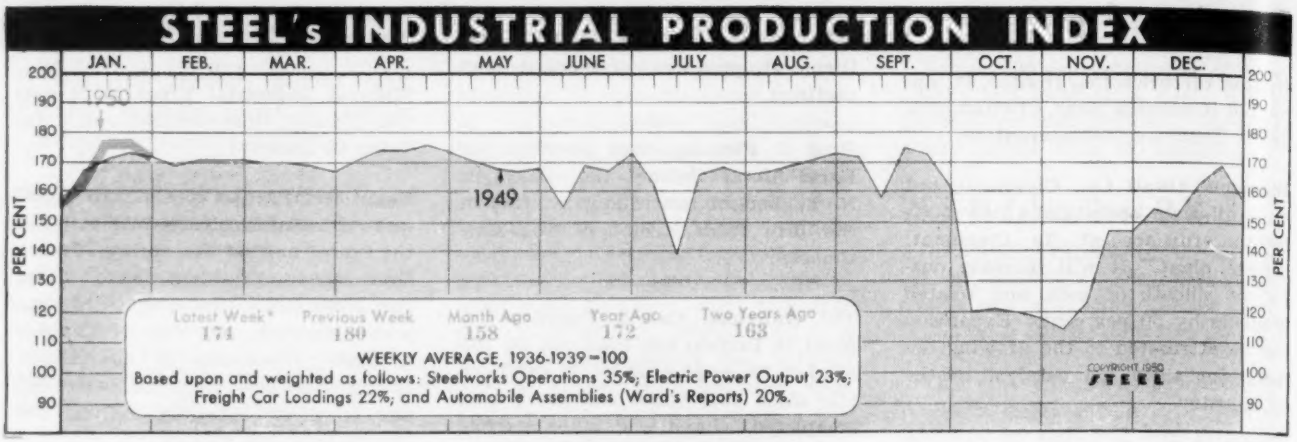
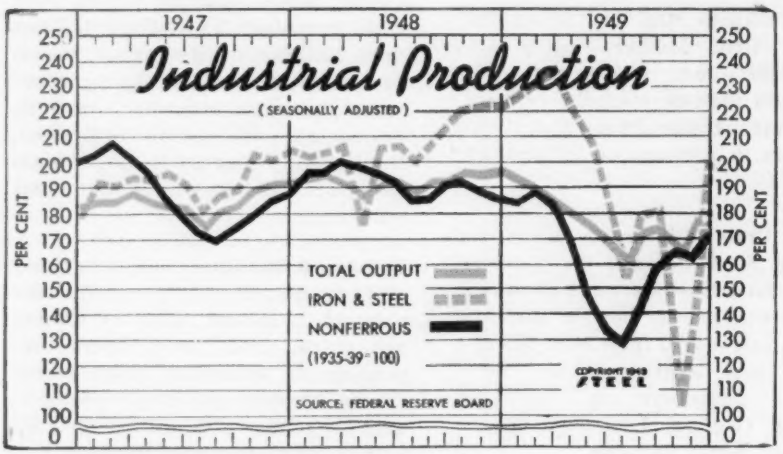
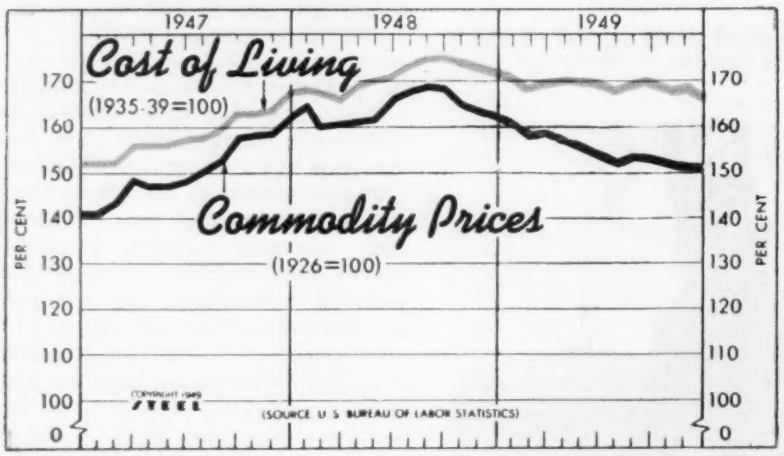


* Week ended Jan. 28 (preliminary).



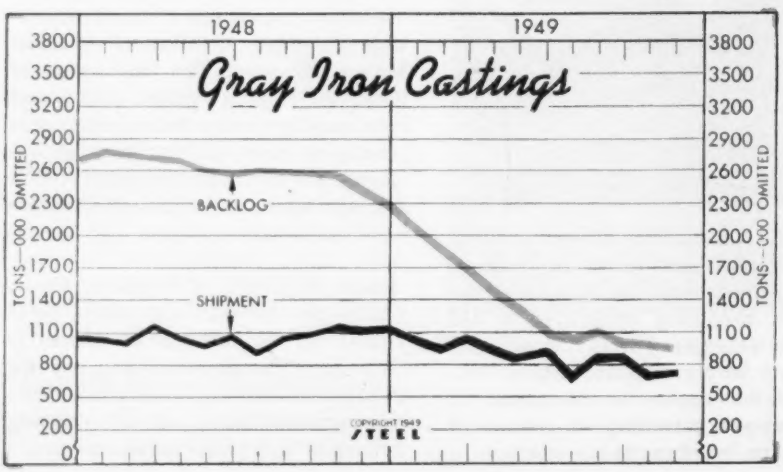
Federal Reserve Board's Production Indexes (1935-1939=100)

	Total Production		Iron, Steel		Nonferrous	
	1949	1948	1949	1948	1949	1948
Jan.	191	193	228	203	184	197
Feb.	189	194	232	203	186	197
Mar.	184	192	233	207	183	200
Apr.	179	188	219	177	168	198
May	174	191	204	206	145	196
June	169	192	177	208	132	194
July	162	186	156	201	128	185
Aug.	170	191	178	207	141	186
Sept.	174	191	179	214	157	192
Oct.	166	195	103	221	164	192
Nov.	173	195	144	224	163	187
Dec.	178	192	198	223	171	184
Ave.	176	192	187	208	160	193



Wholesale Commodity Price—Cost of Living Indexes

	Commodities (1926=100)			Living Cost (1935-1939=100)		
	1949	1948	1947	1949	1948	1947
Jan.	160.5	165.7	141.5	170.9	168.8	153.3
Feb.	158.1	160.8	144.5	169.0	167.5	153.2
Mar.	158.4	161.4	149.5	169.5	166.9	156.3
Apr.	156.9	162.7	147.7	169.7	169.3	156.2
May	155.7	164.2	147.1	169.2	170.5	156.0
June	154.4	166.4	148.0	169.6	171.7	157.1
July	153.4	168.7	150.8	168.5	173.7	158.4
Aug.	153.0	169.5	153.7	168.8	174.5	160.3
Sept.	153.6	168.7	157.4	169.6	174.5	163.8
Oct.	152.2	165.2	158.5	168.5	173.6	163.8
Nov.	151.6	164.0	159.6	168.6	172.2	164.9
Dec.	151.3	162.3	163.2	167.5	171.4	167.0
Ave.	154.9	164.9	151.8	169.1	171.2	159.2



Gray Iron Castings

(U. S. Bureau of Census)

Tons—000 omitted

	Shipments		Backlogs*	
	1949	1948	1949	1948
Jan.	1,040	1,064	2,065	2,803
Feb.	987	1,024	1,857	2,769
Mar.	1,075	1,169	1,639	2,726
Apr.	929	1,051	1,446	2,691
May	867	993	1,243	2,602
June	906	1,072	1,087	2,587
July	697	914	1,032	2,601
Aug.	872	1,051	1,048	2,599
Sept.	881	1,088	980	2,587
Oct.	716	1,148	955	2,523
Nov.	719	1,100	939	2,407
Dec.	....	1,111	....	2,284
Total	....	12,786		

*Unfilled orders for sale to the trade.

The Business Trend

IMPORTANCE of the automotive industry in the nation's metalworking economy again is demonstrated by STEEL's industrial production index. In the week ended Jan. 28 the index dropped 6 points from the all-time weekly high reached in the preceding week because of production lost by the Chrysler strike.

Federal Reserve Board's industrial production index for December climbed 5 points from the total for November to 178 per cent of the 1935—1939 average but was 14 points lower than in December, 1948. Manufacturing is down from the year ago total because of a decline in durables, nondurables holding about the same. Construction contracts in December easily topped the year ago figures while carloadings and minerals slumped noticeably.

STEEL—Nation's steelmaking rate remained stable in the week ended Jan. 28, moving up 1 point to 94 per cent of capacity. Although a few blast furnaces have been shut down or are operating on reduced wind, steelmaking furnace operations are being maintained as long as possible to take advantage of strong demand.

AUTOMOBILES—Immediate effect of the first week of the Chrysler strike was a loss of about 19,000 units. Outturn in the week ended Jan. 28 was 115,639 passenger cars and 23,681 trucks, compared with 132,065 and 26,367 a week earlier. January's production in U. S. plants will be down to about 488,800 cars and 95,900 trucks with Canadian plants adding 23,100 cars and 8400 trucks. Should the strike continue into February, assemblies for that month will be down about 140,000 units from the 640,000 originally scheduled.

PRICES—Wholesale price index and the consumers' price index (cost of living), both reported by the Bureau of Labor Statistics, showed declines in December. The wholesale price index declined 0.2 per cent in December to 151.3 per cent of the 1926 average, 6.8 per cent below a year ago and 10.9 per cent below the postwar peak. An even greater decline was experienced by the consumers' price index between Nov. 15 and Dec. 15. In the latest month reported by the bureau the index declined 0.7 per cent to the lowest point since Mar. 15, 1948.

CONSTRUCTION—Civil engineering construction volume in the week ended Jan. 26 totaled $216,406,000, bringing awards for the first four weeks of this year to more than $915 million. Private construction for the period tops $428 million but many of the awards are for housing, hospitals, etc. Industrial construction is not keeping pace with the high total volume. Federal construction dominates the public awards list and more than doubles the like total for 1949.

COAL—Bituminous coal continues to be mined at a low rate and the fuel pinch is unabated. In the week ended Jan. 21, latest period for which figures are available, 7,250,000 tons of bituminous coal were produced. In the first three weeks of this year 20,320,000 tons of coal were produced, compared with 34,895,000 tons in the like 1949 period.

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	94.0	93.0	94.5	99.5
	Electric Power Distributed (million kilowatt hours)	5,972	6,041	5,493	5,810
	Bituminous Coal Production (daily av.—1000 tons)	1,208	1,237	1,507	1,910
	Petroleum Production (daily av.—1000 bbl)	4,956	4,962	4,996	5,492
	Construction Volume (ENR—Unit $1,000,000)	$216.4	$182.2	$66.9	$212.2
	Automobile and Truck Output (Ward's—number units)	139,500	158,432	113,026	116,471
	*Dates on request. †1950 weekly capacity is 1,906,267 net tons. 1949 weekly capacity was 1,843,516 net tons.				
TRADE	Freight Car Loadings (Unit—1000 cars)	615†	619	496	679
	Business Failures (Dun & Bradstreet, number)	232	231	109	136
	Money in Circulation (in millions of dollars)‡	$26,913	$27,121	$27,765	$27,561
	Department Store Sales (changes from like wk. a yr. ago)‡	none	−5%	+14%	+2%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$13,542	$14,406	$11,844	$13,907
	Federal Gross Debt (billions)	$256.8	$257.0	$257.0	$252.4
	Bond Volume, NYSE (millions)	$21.5	$23.6	$20.5	$17.0
	Stocks Sales, NYSE (thousands of shares)	7,435	7,980	7,977	4,681
	Loans and Investments (billions)†	$67.7	$67.4	$67.4	$62.9
	United States Gov't. Obligations Held (millions)†	$38,131	$37,920	$37,657	$33,749
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	156.13	156.13	156.88	155.05
	STEEL's Nonferrous Metal Composite‡	160.1	160.5	161.6	232.6
	All Commodities†	150.7	150.9	151.4	151.1
	Metals and Metal Products†	169.4	169.4	169.4	175.5
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				

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Men of Industry

WILBUR J. KUPFRIAN

Wilbur J. Kupfrian has withdrawn from Elliott Mfg. Co., Binghamton, N. Y., where he was part owner and engineering director, to establish the **Kupfrian Mfg. Co.,** with offices at the same address as the Elliott company. Two separate manufacturing plants have been set up in Binghamton and Deposit, N. Y. The new organization is successor to the special products division of the parent firm, consisting chiefly of flexible-shaft couplings or remote controls, and wire shielding, particularly for the electronics and instrumentation fields. Other products include Monocoil (Bowden) casing and push-pull controls for marine, automotive and industrial fields. Elliott Mfg. Co. is referring inquiries and orders received on all such items to the new company, but continues to manufacture flexible shafting and accessories for portable power-tool trade and industrial flexible shafting for original equipment manufacturers.

—o—

Acheson Colloids Corp., Port Huron, Mich., announces election of three vice presidents: **P. C. Buck** becomes vice president in charge of production; **M. W. Reynolds,** vice president in charge of sales; **Raymond Szymanowitz,** vice president in charge of research.

—o—

Joseph A. Martino, president, National Lead Co., has been elected to the board of directors of **Allegheny Ludlum Steel Corp.,** Pittsburgh. The two companies announced formation of Titanium Metals Corp. of America, a jointly owned company organized for development, sale and distribution of titanium metal, its alloys and allied products.

GUY A. BAKER

Guy A. Baker has been appointed vice president-manufacturing, and **R. Merton Shields,** secretary, for **Duriron Co. Inc.,** Dayton, O. Mr. Baker, associated with the company for 20 years, has been for several years assistant to the president and secretary. Prior to that he was manager of alloy castings sales. Mr. Shields was previously manager of the Dayton district sales.

—o—

Lyon Metal Products Inc., Aurora, Ill., has elected **Earl D. Power** as chairman of the board to succeed **B. L. Waters,** and **H. B. Spackman** has been elected president to replace Mr. Power. As chairman of the board, Mr. Power will continue to be active chief executive officer of the company and chairman of the executive committee. He will also exercise direct functional control over several phases of company operation. Mr. Spackman will be vice chairman of the executive committee, and will directly supervise sales, production, development and engineering divisions of the company and be responsible for proper co-ordination of functions and operations of all departments. The company also announces promotion of **J. M. Olesen** to general sales manager.

—o—

S. A. Meder has been promoted to a general sales position with the Atlanta district office of **Wheeling Steel Corp.,** Wheeling, W. Va. He will be located at Jacksonville, Fla., as resident representative. **J. A. Holloway** will be transferred from the Chicago office to the general offices in Wheeling as manager of cut nail sales. **L. K. Schaub** of the Chicago office has been transferred to Cedar Rapids, Iowa,

R. MERTON SHIELDS

where he is resident representative under the Chicago district office. **Kenneth P. House,** Pacific Coast manager at San Francisco, has assumed his new duties as one of two assistant sales managers of tubular pipe sales division at Wheeling, the other being **S. C. Wood.**

—o—

Walter D. Myers Jr. has been appointed to succeed **Douglas Via** as sales manager of the industrial insulation department of **Eagle-Picher Sales Co.,** Cincinnati. Mr. Via has resigned to join King Roofing & Heating Co. Inc., Cincinnati, as general manager. Mr. Myers formerly was in charge of industrial insulation sales for Eagle-Picher in the New York market.

—o—

A. M. Boehm has been appointed eastern manager, engine division, **Worthington Pump & Machinery Corp.,** Harrison, N. J., succeeding **W. L. Russell** who has been assigned to handle Canadian sales for John Inglis Co., Worthington's Canadian associate. Mr. Boehm will continue to make the New York district office his headquarters.

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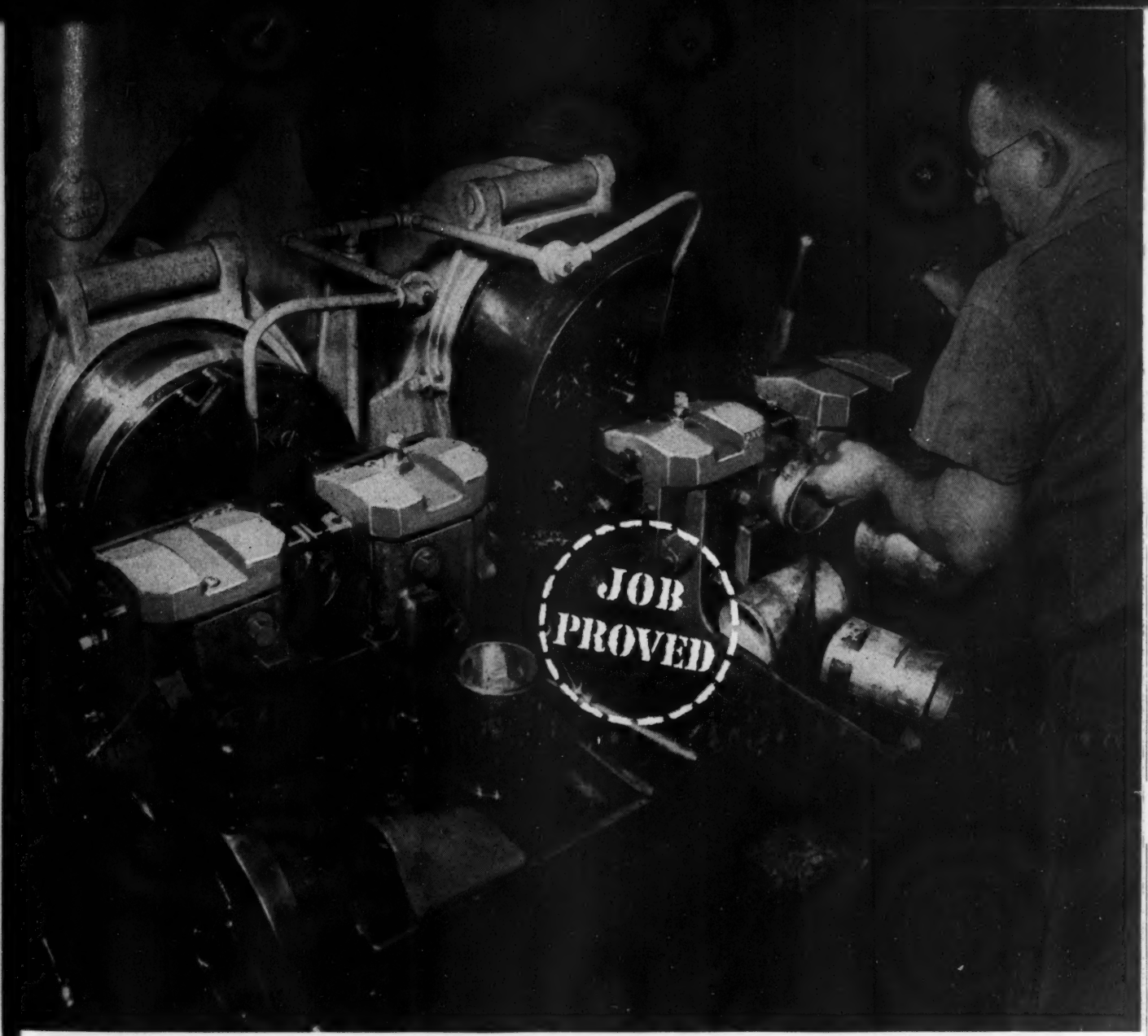
Charles W. Coffin has been appointed sales manager, **Reed-Prentice Corp.,** Worcester, Mass. **J. D. Sherman** was appointed sales engineer in the New York office. He formerly was connected with Norton Co., Worcester, Mass.

—o—

Willard Storage Battery Co., Cleveland, announces that **W. L. Bowron,** sales manager in the Dallas district, has been appointed California district sales manager replacing **W. L. Tyler,** granted an indefinite leave of



CHASER LIFE INCREASED 50%

Sun Cutting Oil Improves Quality of Threads, Steps-up Pipe Nipple Production

Operation: Threading 4" pipe nipples

Machine: Landis Threading Machine

Material: 4" galvanized welded steel tubing SAE 1025-1040

Speed: Threading 1½" on each end of about 300 pieces per 8-hr. day

Chaser Life: 3 days before resharpening

Cutting Fluid: Sun Cutting Oil 31W

A manufacturer threading pipe nipples was not getting satisfactory finished threads with the cutting fluid in use. Chaser life was abnormally short, resulting in excessive downtime and high percentage of rejects, with consequent loss of production.

Changing to Sun Cutting Oil 31W, this shop increased chaser life 50 percent, and reports that "the threads are the best we ever made." With rejects practically eliminated and downtime for changing chasers reduced to the absolute minimum, production has greatly increased.

Sun Cutting Oil 31W is a dark, free-flowing, sulphurized oil. It is recommended for heavy duty jobs where an emulsified cutting oil is not suitable. For further information about Sun Cutting Oils or other "Job Proved" Products for the metalworking industry, call or write the nearest Sun Office. The services of a Sun Engineer are available without obligation.

SUN OIL COMPANY · ***Philadelphia 3, Pa.***

In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS

"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

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absence because of ill health. **N. G. Wolf,** manager of the Dallas plant, will succeed Mr. Bowron as Dallas district sales manager.

—o—

Carl F. Norberg has been elected executive vice president, **Electric Storage Battery Co.,** Philadelphia. He has been vice president in charge of manufacturing since 1944.

—o—

Hollis H. Mosher has been named sales engineer for **Illinois Tool Works** in the Detroit sales office. He had been with the Detroit sales office of Firth Sterling Steel & Carbide Co. of McKeesport, Pa., directing carbide sales operations.

—o—

Joseph R. Bransford, personnel director of **Western Electric Co. Inc.,** New York, has been elected financial vice president succeeding **George L. Best,** who resigned to accept a vice presidency with American Telephone & Telegraph Co. Mr. Bransford will continue responsibility for personnel administration.

—o—

C. Gilbert Norton has been appointed media director of **O. S. Tyson & Co. Inc.,** New York, succeeding **Leigh Doorly,** named account manager in the group headed by vice president **Richard V. Morrison.**

—o—

J. Philip Murphy, executive vice president and manager of **Judson Pacific-Murphy Corp.,** Emeryville, Calif., has been elected president, succeeding **Paul F. Gillespie,** retiring after 30 years' association. **Carlos J. Maas** was elected chairman, and **Douglas A. Bailey,** vice president.

—o—

Richard D. Nugent has been appointed western division manager of **Florence Stove Co.** at San Francisco, succeeding **C. P. Connally Jr.,** named southeastern division manager.

—o—

Greswold Van Dyke has been appointed executive director of **Stainless Steel Producers,** American Iron & Steel Institute, an organization for further development of uses of stainless steel. Activities of the group include the permanent Stainless Steel Industry exhibit and information center in the Architects building, New York.

—o—

C. V. Thompson has been appointed superintendent of the coke plant, Midland Works, **Crucible Steel Co. of America,** Pittsburgh. Also at the Midland Works, **Russell H. Loutzenhiser,** assistant superintendent, electric furnace department, has been appointed superintendent of that department, and **Lester W. Moore** was appointed assistant superintendent, open-hearth department. **R. C. Gilroy** was appointed supervisor of industrial engineering, and **L. Perry,** supervisor of industrial relations at Park Works, Pittsburgh.

—o—

Douglas B. Steimle has been elected a director of **Air Reduction Co. Inc.,** New York.

—o—

Norton Co., Worcester, Mass., announces transfer of four members of its outside sales department. **William C. Howard,** field engineer, Hartford, Conn., area, has been named abrasive engineer with headquarters in New Haven, Conn., and replaces **J. Lawrence Tobey,** who left to go into business with his father. **John W. McCue, F. Donald Wing** and **John W. Wheeler** have been appointed field engineers, the first two named to report to **Raymond E. Taylor,** Chicago office, and Mr. Wheeler will succeed Mr. Howard at Hartford, reporting to Connecticut district manager, **Ronald W. Price.**

—o—

George L. Carr, for the last 13 years associated with Apex Broach Co., has resigned as vice president and sales manager of that company, and has been appointed assistant to the sales manager of **Colonial Broach Co.,** Detroit, in charge of estimating. Before joining Apex, Mr. Carr spent 13 years in sales engineering activities for Arrow Tool & Reamer Co.

—o—

Kenneth G. Jobson, Linde Air Products Co., unit of Union Carbide & Carbon Corp., New York, has been elected president of the **Compressed Gas Association.** He joined Linde Air Products Co. in 1923 and the succeeding 27 years he devoted almost exclusively to improvement of the design, manufacture and test of cylinders and pressure vessels and their appurtenances used by industry.

—o—

Walter E. Oelschlaeger has been appointed manager of the by-products coke department of **Republic Coal & Coke Co.,** Chicago. He has acted for the last 16 years as assistant to **Lewis D. McClaren,** who died Jan. 17.

—o—

Hans Ernst, director of research, **Cincinnati Milling & Grinding Machines Inc.,** Cincinnati, has been selected Cincinnati's outstanding engineer of the year. He is the author of many booklets and papers in the field of mechanical engineering, particularly on the subject of metal cutting.

—o—

Richard D. Jolls has been appointed gas process engineer, **Gas Machinery Co.,** Cleveland. **Vernon J. Pugh** joins the company as a field engineer.

—o—

G. R. Carrier has been appointed exclusive representative for air and hydraulic cylinders and special machinery in Chicago and northern Illinois by **Hydro-Line Mfg. Co.,** Rockford, Ill.

—o—

Elastic Stop Nut Corp of America, Union, N. J., announces appointment of **Robert F. Fettig** as district manager for the Detroit and Michigan sales areas. He had been district manager for McKay Co., Pittsburgh, and prior to that was with Detroit Diesel Division, General Motors Corp.

—o—

Charles F. Cooper has been appointed assistant sales manager of the central district of **Kaiser Steel Corp.,** Oakland, Calif.

—o—

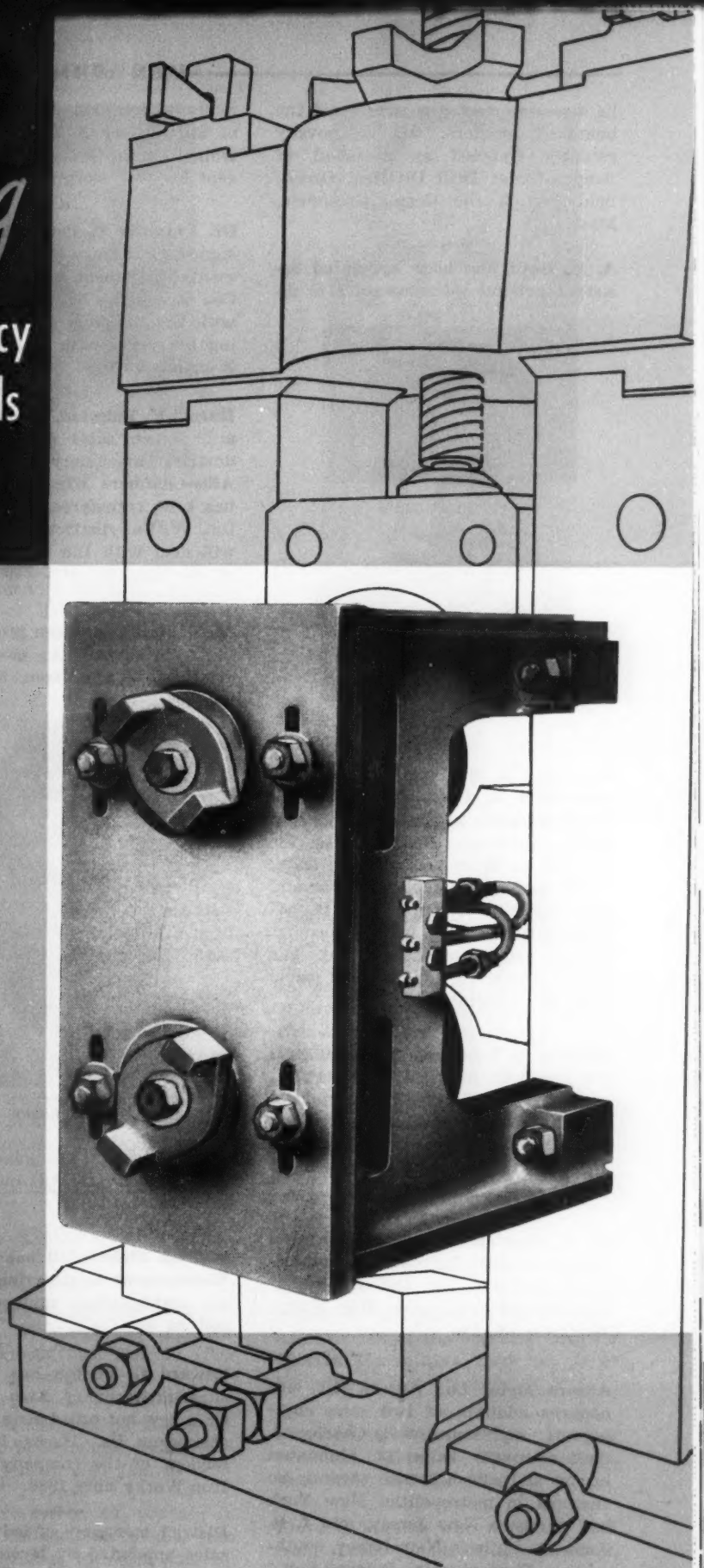
F. J. Sikorovsky has been elected president of **Federal Drill & Tool Works,** manufacturer of aircraft tools, New York, a division of Avildsen Tools & Machines Inc., of which

KENNETH G. JOBSON

F. J. SIKOROVSKY

Mack-Hemp *end-thrust bearing*

Improves Operating Efficiency of Rod, Bar and Shape Mills



Not much for glamour, but a bear for work, this Mack-Hemp End-Thrust Bearing does an all-'round job of improving the operation of rod, bar and shape mills.

Developed by Mackintosh-Hemphill engineers to establish precise control over the axial matching of roll passes, this thrust bearing is a self-contained, compact unit which will team up with any type of good radial neck bearing, and which can be used on any mill stand where one end of the rolls is available for its attachment.

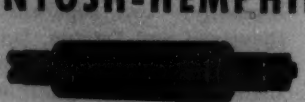
One of the most important features of the Mack-Hemp Bearing is the simple end-wise adjustment device which assures matched grooves and precise product tolerance on high-speed finishing stands.

Other advantages observed in exhaustive tests include:

- **Elimination of conventional side thrust collars**
- **Permanence of roll groove alignment**
- **Increased life of roll grooves and guides**
- **Long life of anti-friction thrust bearings**
- **Reduced electrical loads in starting and running mill**

Latest in the long list of products designed to improve metal-rolling techniques, this Mack-Hemp End-Thrust Bearing has passed every operating test. Full details are available—a qualified engineer is ready to show you why you should keep an eye on what's new at Mack-Hemp.

MACKINTOSH-HEMPHILL CO.



PITTSBURGH AND MIDLAND, PA.

Makers of the Rolls with the Striped Red Wabblers

MACKINTOSH-HEMPHILL PRODUCTS INCLUDE:
rolls . . . steel and special alloy castings . . . completely integrated strip mills . . . heavy duty engine lathes . . . the new Mackintosh-Abramsen straighteners . . . improved Johnston patented corrugated cinder pots and slag handling equipment . . . shape straighteners . . . shears . . . levellers

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he also was elected a member of the board of directors. Mr. Sikorovsky recently resigned as president of Ampco Twist Drill Division, Greenfield Tap & Die Corp., Greenfield, Mass.

—o—

A. S. Basil has been appointed assistant general sales manager to di-

A. S. BASIL

rect the national sales of **Kaiser Aluminum & Chemical Sales Inc.,** Oakland, Calif., in electrical wire and cable products. Headquarters for the sale of these products are being established at the cable, rod, bar and wire plant at Newark, O. **H. W. Biskeborn,** who has been a member of the production department, has been transferred to electrical cable sales as technical director.

—o—

William A. Munkacsy has been elected president, **Munray Products Inc.,** sales division of Poly-Cyclo Products Co., Cleveland. He also is president, Poly-Cyclo Products Co. As head of Munray Products he succeeds **T. R. Gill,** resigned.

—o—

R. J. Cowden has been appointed sales manager for engines and related products for the **Lycoming-Spencer Division,** Avco Mfg. Corp., Williamsport, Pa.

—o—

Aurora Metal Co., Aurora, Ill., announces addition of two sales engineering representatives: **Charles J. Sauter** covers sales of aluminum bronze and silicon bronze vacuum die castings in metropolitan New York and northern New Jersey, and **I. R. Jones** in southern New Jersey, southeastern Pennsylvania, Delaware and Maryland.

—o—

Ferdinand Schmitz has been named vice president of **Seattle Steel Co.** and **Inland Empire Steel Co.,** a subsidiary at Spokane, Wash. Mr. Schmitz resigned as vice president of Pacific Car & Foundry Co., controlled by the same interests, to accept his new assignment.

—o—

Dr. Franklin T. Peters has been assigned to the newly formed development department of **Glyco Products Co.,** Brooklyn, N. Y. He has been with the company since 1947 following ten years with E. I. du Pont de Nemours & Co.

—o—

Harold H. Indestad, engineer's assistant, screen sales section, basic industries machinery department of **Allis-Chalmers Mfg. Co.,** Milwaukee, has been transferred to the Charleston, W. Va., district office, where he will deal with the sales of products of the basic industries department.

—o—

M. D. Barry has been promoted from chief accountant to comptroller of **Southern States Iron Roofing Co.,**

M. D. BARRY

Savannah, Ga. He joined the company in 1940 and was made chief accountant in 1946.

—o—

William Steinwedell has joined **Wolf Management Engineering Co.,** Chicago, management engineer and consultant firm.

—o—

Edward G. Fenton has been named superintendent of **Alan Wood Steel Co.'s** new hot-rolled strip mill in Conshohocken, Pa. He has been superintendent of the company's Schuylkill Iron Works since 1936.

—o—

District managers of industrial truck sales appointed by **Hyster Co.,** Portland, Oreg., are: **Donald R. Shaffer,** appointed manager of territory comprising southeastern Canada, eastern Michigan, northern Ohio and southwestern New York; **John F. Wright,** who will supervise truck sales in Alaska, western Canada, Washington, Oregon and parts of Montana and Idaho; and **Karl T. Barr,** to manage territory of Hawaiian Islands, California, Arizona, Nevada and Utah.

—o—

Charles G. Barnard has been appointed comptroller of **Balboa Pacific Corp.,** Fullerton, Calif.

—o—

W. Arthur Wall and **Oscar Fischer** have joined the staff of **Cobalt Chemical & Refinery Co. Ltd.,** Cobalt, Ont., Canada.

—o—

J. C. Kemp, general sales engineer, **Ampco Metal Inc.,** Milwaukee, has been appointed district manager of the Chicago office.

—o—

National Steel & Shipbuilding Co., San Diego, Calif., has appointed **Ray Fox** executive vice president. **A. L. Brosio** was named vice president and general manager.

—o—

Added to the sales staff of **Wrought Washer Mfg. Co.,** Milwaukee, are **W. E. Pfleger** to cover Wisconsin, Iowa, Minnesota, etc., and **Thomas Tannert** to head the newly formed Chicago office.

—o—

Boice-Crane Co., Toledo, O., has appointed **John P. Davenport** as its district factory representative to serve its dealers in southern Indiana, southern Ohio and Kentucky, maintaining office in Louisville.

—o—

Walter F. Knebusch has been appointed director of manufacturing for **Harris-Seybold Co.,** Cleveland, a newly created position which will provide

WALTER F. KNEBUSCH

more complete co-ordination and guidance of manufacturing in the company's two separate plants in Cleveland and Dayton, O. Mr. Knebusch had been works manager of the Harris Division plant in Cleveland since 1943. **Nelson O. Scourfield,** manager of the Seybold Division in

Dayton, continues to be responsible for overall operations in that plant.

—o—

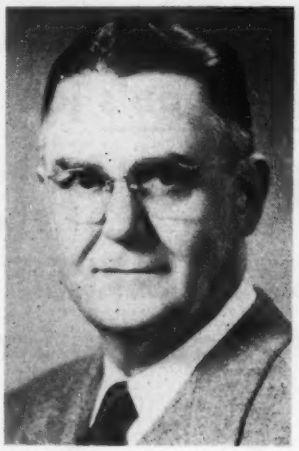
General Electric Co., Apparatus Department, Schenectady, N. Y., announces changes as follows: Small apparatus divisions—**T. D. Foy,** named administrative assistant; **F. T. Lewis,** manager of manufacturing, names as staff assistants **F. J. Boucher, D. S. Lisberger** and **H. B. Miller;** and **B. A. Case,** manager of engineering, has **T. L. Mayes** as his staff assistant. Large apparatus divisions—**E. E. Johnson,** manager of engineering, names as his staff assistants **P. L. Alger, Marshall Anderson, T. M. Linville, C. H. Ridgley** and **F. P. Wilson Jr.; C. W. Fuller** was transferred to staff of manager of manufacturing; **N. E. Firestone** is staff assistant to manager of manufacturing; **K. O. Schulte,** manager of wage rates; **W. H. Bobear,** manager of purchasing; **T. F. Garahan,** production manager; **K. N. Bush,** assistant production manager, and **A. V. Feigenbaum,** supervisor of training, manufacturing personnel.

—o—

Roland J. Berkol has been named sales development engineer for **Atlas Steels Ltd.,** Welland, Ont., Canada. He formerly was with Rustless Iron & Steel Corp. of Baltimore, and American Smelting & Refining Co. The company also named **A. Earle Higgins** and **Charles F. Press** of New York to direct its promotional campaign on uses and fabrication of stainless steel throughout Canada.

—o—

Wyckoff Steel Co., Pittsburgh, announces appointment of **H. L. Schultz** as district manager of its Milwaukee office, succeeding **Edwin L. Wolf.**



CECIL E. BALES

Cecil E. Bales, formerly vice president, **Ironton Fire Brick Co.,** Ironton, O., has been elected president succeeding **E. F. Myers,** who becomes board chairman and treasurer. Active in the refractories industry for many years, Mr. Bales is a director and member of the technical advisory committee of American Refractories Institute. He served two terms as president of Ohio Ceramic Industries Association, and is a past president of American Ceramic Society.

—o—

Allied Oil Co. announces appointment of **Russell E. Mentzer** as district manager, Cleveland, to direct sales in Cuyahoga, Lake, Geauga, Lorain and Ashtabula counties.

—o—

Leroy Dougall has been transferred from Chicago headquarters of **Vapor Heating Corp.** to its St. Paul office, to work with railroads on service problems in Minnesota, Iowa, Wisconsin, the Dakotas and Washington.

WARD DOUGHERTY

Ward Dougherty has been appointed sales engineer, machine division, **Osborn Mfg. Co.,** Cleveland. He will cover southwestern Ohio, southern Indiana, Kentucky, Missouri and Kansas, with headquarters in Cincinnati. Mr. Dougherty has been with the company over 25 years, and has served in various capacities, most recently in the export division.

—o—

Stoddard M. Stevens has been elected a director of **Babcock & Wilcox Co.,** New York.

—o—

Aluminum Association, New York, announces election of **R. S. Reynolds Jr.,** Reynolds Metals Co., Louisville, as president for the ensuing year. Elected vice presidents are **E. G. Grundstrom,** Advance Aluminum Castings Corp., Chicago; **M. E. Rosenthal,** United Smelting & Aluminum Co. Inc., New Haven, Conn.; and **George N. Wright,** John Harsh Bronze & Foundry Co., Cleveland.

OBITUARIES...

James F. McKeone, 61, superintendent, steel foundry, **Vulcan Iron Works,** Wilkes-Barre, Pa., since 1944, died Jan. 24. He previously was superintendent, Strong Steel Foundry Co., Buffalo, for 18 years.

—o—

D. McCall White, 69, automotive engineer and former vice president, **Cadillac Motor Car Division,** General Motors Corp., died in Hartford, Conn., Jan. 29.

—o—

Alan E. Ashcraft, 68, retired vice president-manufacturing, **Fairbanks, Morse & Co.,** Chicago, died Jan. 23.

—o—

Walter Voigtlander, 64, who retired in October as chief engineer and director of research for **Union Wire Rope Corp.,** Kansas City, Mo., died Dec. 29.

—o—

Sidney B. Cooper, transportation engineer for **Westinghouse Electric Corp.,** Pittsburgh, died Jan. 20 after an illness of six weeks.

—o—

Clifford P. Jensen, 50, parts and accessories service manager, **White Motor Co.,** Cleveland, died Jan. 20.

—o—

Wilmer C. Swartley, 69, partner in the firm of **Philadelphia Steel & Iron Co.,** Conshohocken, Pa., died Jan. 23.

—o—

James E. Thoms, 66, vice president and general manager, **Peerless Machine Co.,** Racine, Wis., died Jan. 26.

—o—

Gordon B. Ruston, 37, vice president and manager, **Breen Wire Products,** Toronto, Ont., Canada, died Jan. 22 following a heart attack.

—o—

Frank A. Ketcham, 74, who retired as chairman of the board of **Graybar Electric Co.** in 1944, died Jan. 24 at his home in New Rochelle, N. Y.

—o—

Frederick W. Cohen, 79, retired vice president, **Metal & Thermit Corp.,** New York, died Jan. 26.

—o—

Floyd C. Mantel, who retired in 1946 from **Leece-Neville Co.,** Cleveland, where he served as an engineer, died Jan. 31.

—o—

John H. Darragh, 52, assistant secretary-treasurer of **Wright Aeronautical Corp.,** died Jan. 25 in Paterson, N. J.

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Production AND Engineering
NEWS AT A GLANCE

STRAW IN THE WIND— Ten-pound electrostatic generator developing 20,000 volts and one developing 6000 volts—both driven by spring motors with a manually operated governor—are being tested by Army engineers at Fort Belvoir, Va., the Department of Defense reports. Designed as power supply for electron image tubes, the influence-type generators employ new insulation materials, plastics and techniques of hermetic sealing. They provide a compact, lightweight, more effective supply than the present converter unit.

ANOTHER "YARDSTICK"—Methods successfully employed in the optical industries now may be applied to machine tool and general engineering field by means of an instrument reported by Engis Equipment Co., Chicago. With the device, for example, it is possible to produce a chart showing waviness in a surface plate, machine bed or shaft to an accuracy better than 0.000004-inch. And by employing simple accessories, such as gage blocks, large number of extremely accurate angular measurements can be taken directly. Linear measurements can be determined by simple computation without regard to distance and wear, distortions due to temperature changes or other factors.

CUTS COST CORNER— Machining and handling costs plus 40 pounds of materials are currently being trimmed from each chain hoist produced by a New Jersey manufacturer. Savings are the result of redesigning and casting the parts in an aluminum alloy. Produced by Fisher Casting Co. of North Plainfield, for Harrington Co., Philadelphia, makers of the hoist, the ten components required are cast in aluminum-magnesium-zinc alloy developed by Federated Metals Division of American Smelting & Refining Co. The metal is said to attain high strength by natural aging at room temperature.

SHOCK-WAVE POWER— Potential heat and power that lie in noises—noises about as loud as the popping of a paper bag—may some day be utilized to operate engines or touch off explosions, Dr. Arthur R. Kantrowitz told a section of the American Physical Society meeting at University of Virginia. He revealed that in carrying out experiments supported by the Office of Naval Research at Cornell University, it was found that shock waves set up by noises have a tendency to converge at a single point and, in so doing, generate enormous pressures and temperatures.

ANNIHILATION RADIATION—Study of penetration of high energy x-rays in heavy metals reveals that as energy of a betatron is increased up to 25 million volts, the penetration also increases. Beyond this voltage the penetration decreases. Reason for this decrease at higher energies, says Dane T. Scag, betatron physicist at Allis-Chalmers Mfg. Co., is a phenomenon known as pair-production or annihilation radiation. The absorption due to secondaries, the tertiaries and higher order x-rays becomes increasingly great as the betatron energy is increased to 30, 50 and 100 million volts. He states that if one were to penetrate 10 inches of steel with betatron rays, it would require an exposure six times greater at 10 million volts than at 25 million volts. When radiographing 20 inches of steel, a 10-million-volt betatron would require an exposure 23 times greater than a 25-million-volt betatron.

CONTROL PROCEDURE — Good welds are made in commonly welded metals only by using proper procedures. It is a matter of concern and economic loss when production plants do not assure themselves that good spot welds are being consistently obtained without use of subsequent expensive inspection and repair. J. Heuschkel and H. Bitzer of the Westinghouse research lab state that uniformly high quality welds can be produced successfully by following a prewelding control procedure — taking into consideration such factors as material uniformity, its characteristics, adequate equipment and controls. (p. 82)

"SEE-ABILITY" — To what degree are employees handicapped by visual difficulties? How can they be aided? These are some of the questions posed by metalworking companies discovering that there is a definite relationship between a worker's seeing ability and his productive efficiency. American Optical Co. studies indicate that the number of workers who are visually handicapped in any one company may range from 10 to 60 per cent. But on the average, one out of three employees will be found in need of visual care. (p. 87)

LABOR STILL NEEDED—Although many phases of foundry operation are pretty much mechanized, certain chores still require physical effort on the part of the worker. In the removal of pads, lumps, fins and metal added for making certain designs castable, for example, electric and air-operated grinders, chipping tools and scarfing torches are used. In manipulating these tools, the worker expends much physical effort. Furthermore, the job of snagging, as the operation of metal removal is called, also requires skill. Excess metal must be chipped or ground to the casting contour. (p. 90)

CONTINUOUS TESTS — Many new mining methods are being studied at the Styrian ore mine. Reports indicate that the continuous large-scale tests are showing surprising results. Magazine, stope and blank mining by caving are some of the methods currently being tested. One of the newest methods to be undertaken is funnel mining which is now being set up for actual operation. (p. 102)

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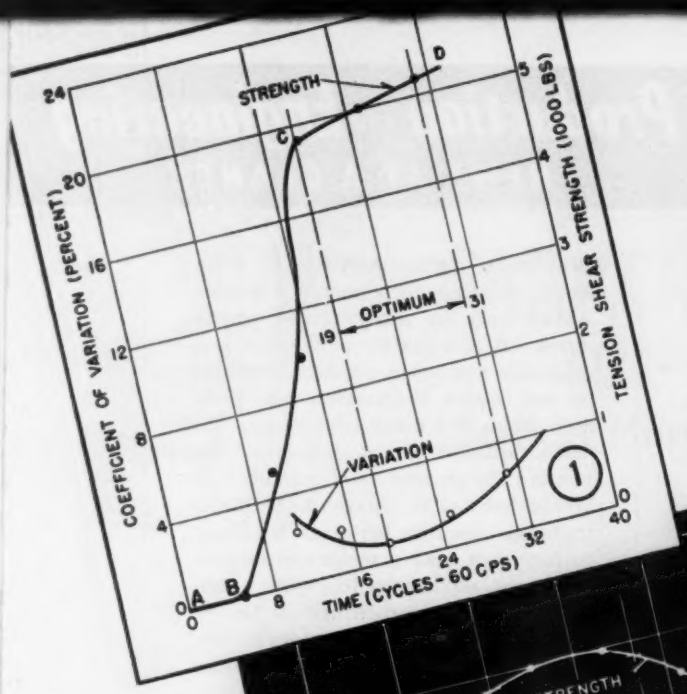
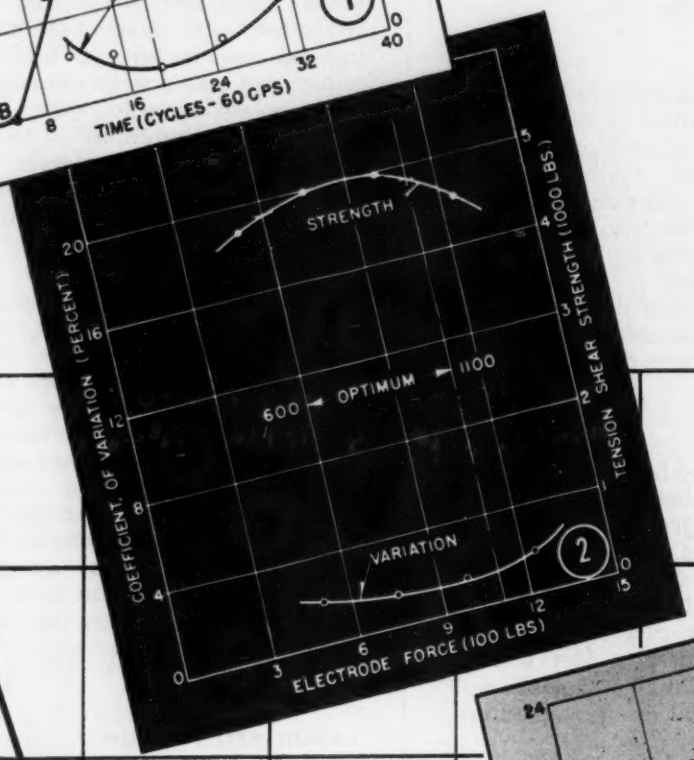
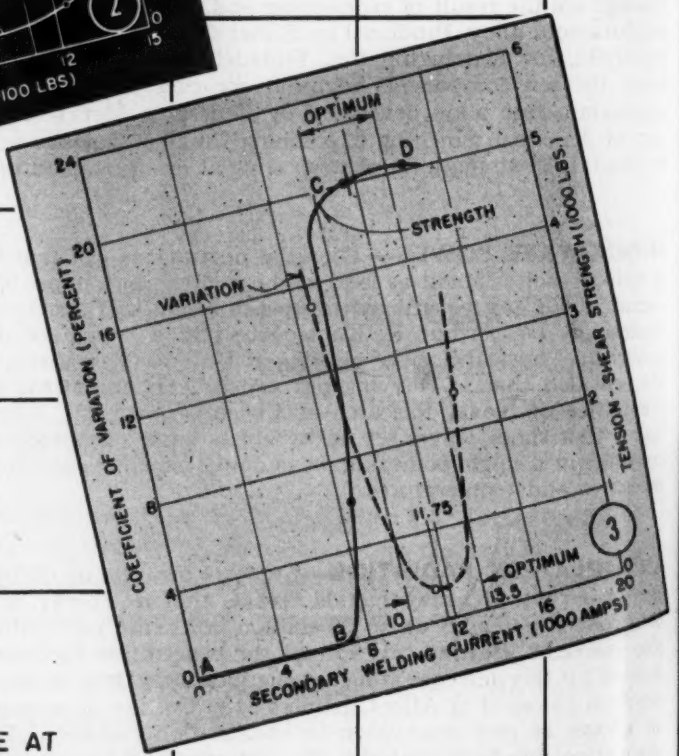
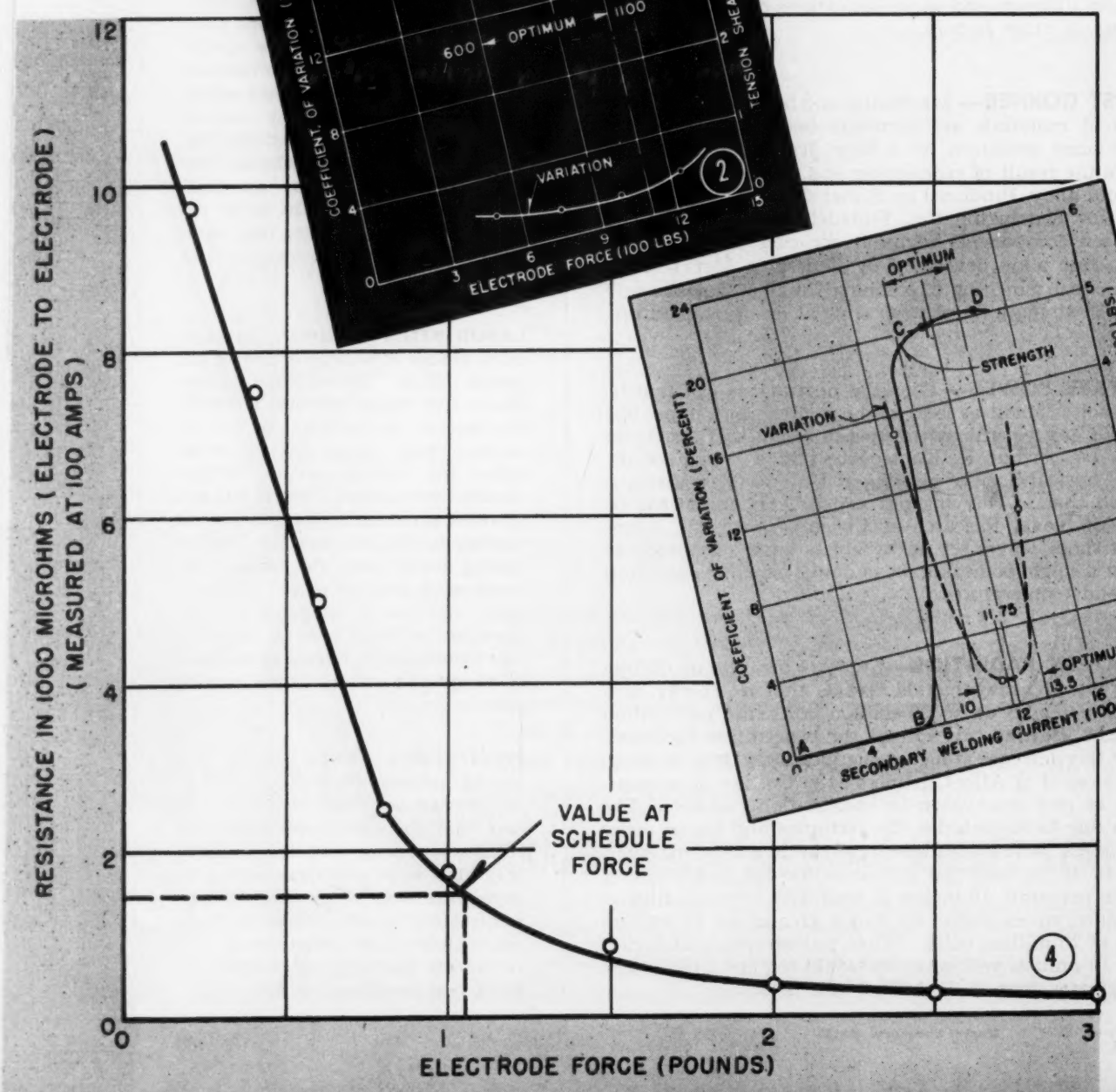
How To Make CONSISTENT

Recent studies at Westinghouse research laboratories indicate that uniformly high quality welds can be produced very successfully by following a well planned pre-welding control procedure








RESISTANCE IN 1000 MICROHMS (ELECTRODE TO ELECTRODE)
(MEASURED AT 100 AMPS)
VALUE AT SCHEDULE FORCE
ELECTRODE FORCE (POUNDS)
4

By J. HEUSCHKEL and H. BITZER
Research Laboratories
Westinghouse Electric Corp.
East Pittsburgh, Pa.

SPOT WELDS

PRODUCTION of consistent spot welds to a specified quality standard, usually a minimum strength requirement, with complete assurance that such welds have been secured, is a necessary objective of welding supervision and quality control personnel.

Good welds are made in commonly welded metals by using the proper conditions. It is a matter of concern and economic loss when production plants do not assure themselves that good spot welds are being consistently obtained without the use of subsequent expensive inspection and repair.

Uniformly high quality welds can be successfully produced by following a prewelding control procedure. For a properly designed part this involves knowing in advance, from inspection testing, that the work material is uniform in its characteristics; that the proof tested welding schedule to be used is capable of producing welds of the desired properties in a consistent manner; and from actual measurement that both the equipment and controls are providing the conditions required by the operating schedule.

Also it is necessary to know in advance the limits of permissible deviation from the setup schedule so that the necessary instrumentation for detection of variations from the desired welding conditions can be intelligently evaluated. Obviously an operating range is necessary. A periodic checkup on weld quality itself need involve only the most inexpensive form of peel or separation tests as conforms to reasonable inspection practice. These tests can be made quickly on the floor.

Variables Should Be Controlled—Adequate instrumentation in conjunction with established and proof tested schedules can be employed to show when the limits are about to be violated before the actual inconsistencies occur. This procedure is shown to be superior to the chart method of statistical control. Since the properties of spot welds may vary with either changes in welding conditions or with material characteristics, the production of consistent welds requires that both sets of variables be subject to control. When both conditions are under control the quality uncertainties vanish and the need for subsequent expensive inspection is greatly reduced or eliminated.

Most consistent spot welds are produced when the welds are of maximum strength and the welding conditions are within midrange for producing those strengths. Basic reason for the production of inconsistent spot welds is related to the use of sensitive schedules, too-wide variations in the welding conditions and insufficient allowance for current shunting through prior welds. There are others, such as surface conditions, analyses variations, and shifting amounts of metal within the secondary loop. When uniform material and operating conditions are used in combination with schedules insensitive to minor variations, spot welds in steels having a coefficient of variation less than 5 per cent can readily be produced.

Assures Proper Welds—Using statistical methods in the determination of the suitability of the original schedules and knowing the influence of welding variations in the results it is possible to establish rational operational limits within which production may be carried out with assurance that welds of the desired strength and uniformity are being produced.

It is possible to select welding schedules which are sufficiently insensitive to variations in both welding and material conditions that substantial changes can be effected without influencing either the strength or consistency of the results produced. Such schedules are desirable from the point of view of uniformity of production quality.

Spot Welds—Spot welds are made by passing electric current through locally compressed portions of the overlapped work parts for a sufficient period of time to melt the base metal, without overheating it. Electrodes clamp the work material together during,

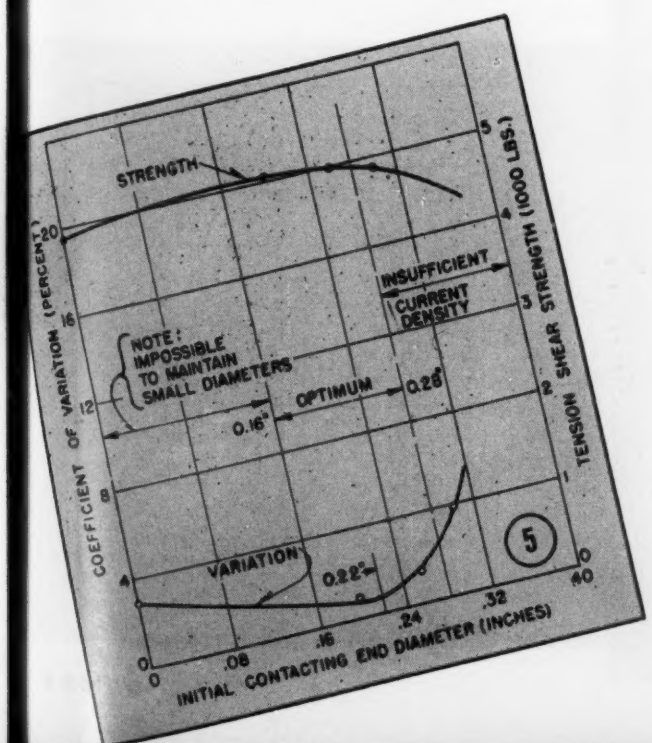
Fig. 1—Relation between welding time and spotweld strength and consistency

Fig. 2—Relation between welding force and spotweld strength and consistency

Fig. 3—Relation between welding current and spotweld strength and consistency

Fig. 4—Relation between force and contact resistance

Fig. 5—Relation between contacting electrode diameter and spotweld strength and consistency. (Figs. 1, 2, 3 and 5, 0.095-inch low carbon steel)



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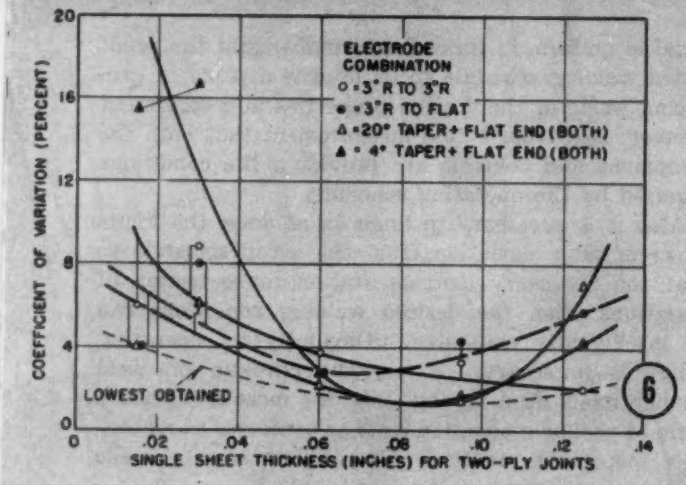
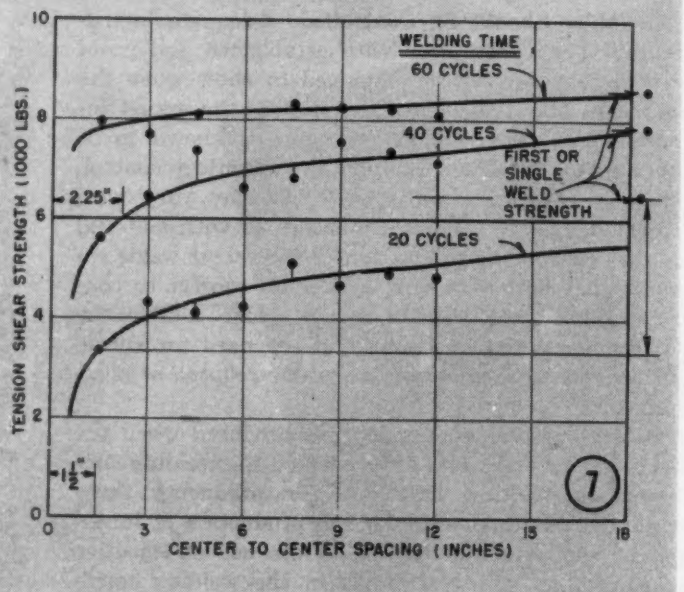

ELECTRODE COMBINATION
○ = 3" R TO 3" R
● = 3" R TO FLAT
Δ = 20° TAPER + FLAT END (BOTH)
▲ = 4° TAPER + FLAT END (BOTH)
LOWEST OBTAINED
COEFFICIENT OF VARIATION (PERCENT)
SINGLE SHEET THICKNESS (INCHES) FOR TWO-PLY JOINTS
6



preceding and following this interval. Magnitudes of the current, time, and force and the electrode size, shape and composition are caused to vary with the thickness, composition, temper and surface conditions of the parts being welded. Machines and controls are available for supplying the necessary pressure and heat energy required. For the insensitive metals, such as low carbon steel, it has been well established that the work parts may be effectively mechanically clamped between the impressing electrodes by the use of a range of electrode sizes, shapes and forces.

If too much current is passed for too long a period the locally compressed metal will be overheated, and expelled from the weld zone in the form of a molten stream. This is a readily visible phenomena and the resultant welds are often cracked, distorted and over indented.

Welds May Be Inadequate—On the other hand, if magnitude of the current is reduced too much the metal may externally appear to be heated to the proper degree, from the operator's viewpoint, and yet the welds made will have inadequate strength as the result of the too low internal temperatures achieved. As current is further reduced, or if some of the available current is shunted through previously made welds, ultimately no weld is produced even though automatic sequencing controls may be properly func-

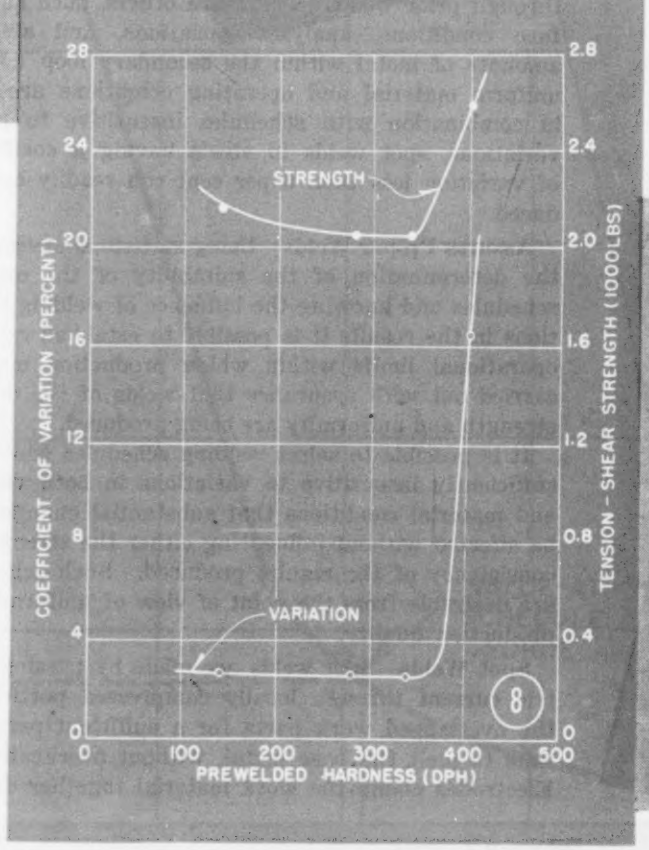
Fig. 6—Influence of electrode contour on spotweld consistency (low carbon steel)

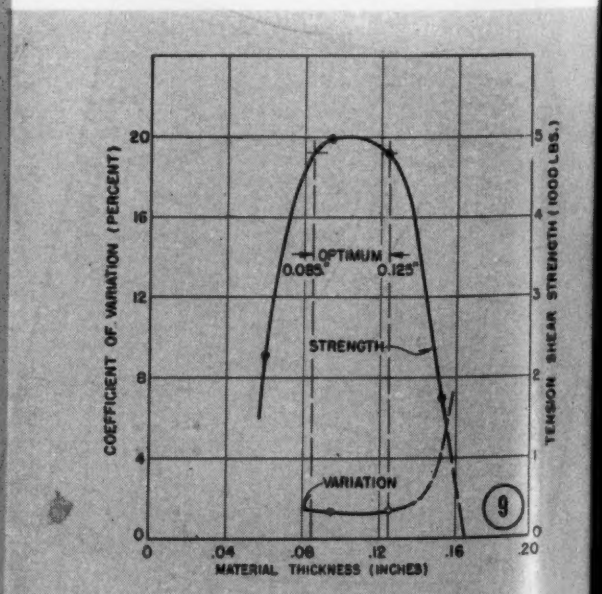
Fig. 7—Relation between spotweld spacing, welding time and tension shear strength (0.125-inch thick low carbon steel)

Fig. 8—Relation between prewelded 0.05-inch stainless steel hardness and strength and consistency of spotweld at one setting

Fig. 9—Relation between material thickness, spotweld strength, consistency (constant setting)

Fig. 10—Application of variation coefficient to spotwelding schedules over range of thicknesses





tioning but providing inadequate current at the point where it is needed.

In the absence of installations wherein controls pass the correct amount of energy at the necessary rates it is apparent that a system of rigorous schedule regulation must be enforced if consistent spot welds of the desired strength are to be produced. Too large variations in welding time or force; in electrode size, shape, or composition; and in work material characteristics and consistencies also influence spot weld properties and consistencies. For prewelding quality control one must therefore determine a suitable schedule, the permissible limits of deviation from that schedule, and then provide means for knowing what the machine and controls are delivering to the weld nugget.

Test Method—This report is confined to stainless and low carbon steels. The same principles apply to other metals with detail variations. Standard tension-shear tests were made, and the average group strength, the statistical standard deviation from the average, and this deviation expressed as a percentage of the average, called the coefficient of variation, were obtained for each condition investigated. This procedure was used because entire systems involving different weld strengths were to be compared. Such comparisons cannot be made directly on a basis of strength, or upon the standard deviation which may become large in value with high strengths. A low coefficient of variation indicates a high order of consistency; a zero value would represent absolute uniformity. The standard deviation is calculated by taking the square root of the difference between the average of the squares of the individual values and the square of the average value. The ratio of this derived value to the average obtained, expressed as a percentage, is used throughout as the coefficient variation and as a measure consistency.

Static welding force only was measured. This was done with a calibrated force bar. The 50 kva air-operated press type spot welder used was subject to fluctuations of air line pressure. Time was controlled by a synchronous electronic control and was measured with a clock type cycle counter, calibrated for accuracy against a magnetic oscillograph. Secondary current was measured from an indicating meter with a signal picked up from an iron core inductor placed over the lower arm of the secondary loop. While the accuracy of this method is open to some question it is believed that the reported values are comparable, at least for illustrative purposes.

As a starting point a series of 95 specimens were first made and tested in tension shear to demonstrate that a previously established schedule[1] was adequate for making consistent welds in 0.095-inch thick low carbon steel. For welding two pieces with single or widely spaced spots this schedule called for the use of:

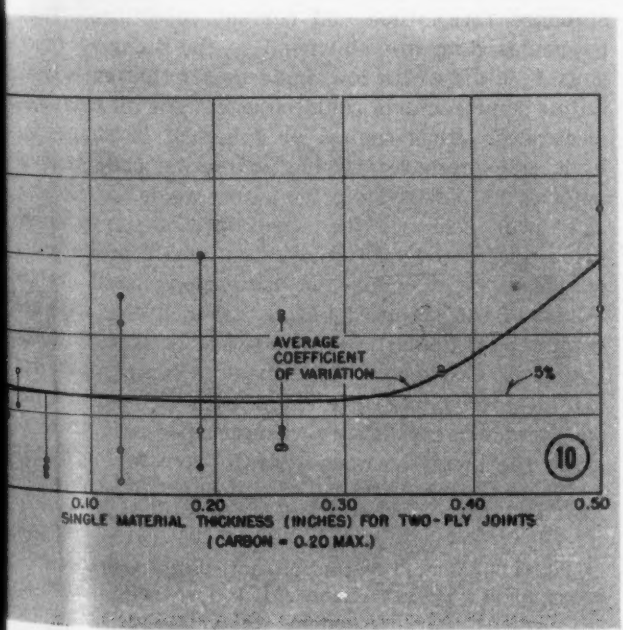
Force	1050 pounds
Current	11,400 amp., rms
Time	25 cycles (60 cps)
Electrodes	0.26-inch max. end x 4° face taper

On another material lot of the same thickness, a series of 20 specimens were then made and tested to demonstrate that the same schedule would again produce consistent welds, although the average obtained strength may be different due to differences in material characteristics. This overall procedure fulfills one specification requirement that process approval must be obtained through a demonstration of equipment performance.

A continuing series of 42 three-specimen groups was next prepared with a willful change from the established schedule after every third group. Immediately after each such variation the machine-electrode-control system was brought back to the preestablished schedule; then another set of 3 three-specimen test groups was made. Strength data from these specimens provide a groundwork for the use of the control chart system[3] using statistical methods. Sufficient supplementary data were also obtained for one material to show why and how much variation is obtained in both strength and consistency by off-schedule welding. The compiled graphs of resulting strengths clearly indicate that had the welds been made on an actual production line run, the existence of indicating instruments on the welding variables would have prewarned the operators before off-quality welds would have been produced.

Welding Variables, Force—Influence of variations of force only, upon weld strengths and consistencies, are shown in Fig. 2 for four 3-specimen lots. Best value for the particular material, from the production viewpoint, would have been 850 pounds, since with that value a plus or minus variation of as much as 30 per cent in force magnitude would not have materially influenced weld strength or consistency. Forces exerted as the result of cam or spring actions or from air or hydraulic pressures can and do vary somewhat with the source magnitudes or frictional values. Significant new point is that the best consistency was obtained with welds of maximum strength and within midrange of the operating conditions for producing those strengths.

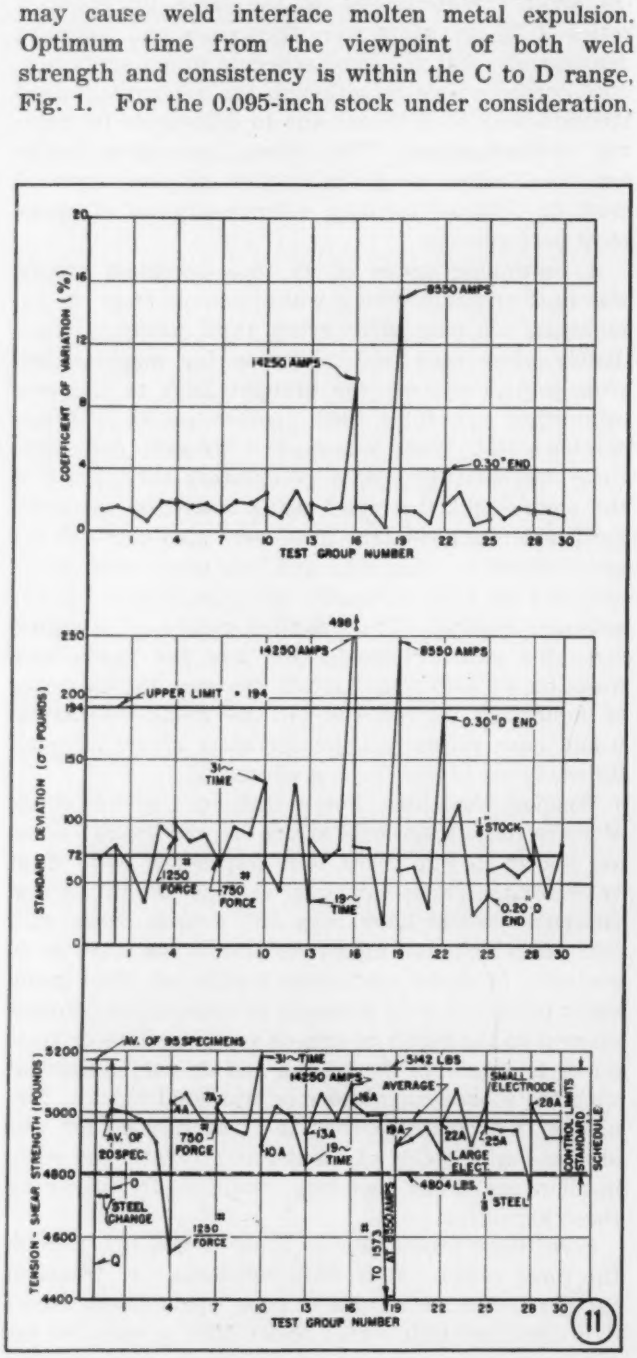
Sometimes production is done at the low side of the force range. With such schedules any transient further reduction results in poor welds. From Fig. 4 it is apparent that forces under 1000 pounds for the



particular material and electrode combination, result in rapid changes in initial contact resistance, and thus may tend to accentuate surface heating.

Time—The general influence of time of current flow upon weld strength and consistency is illustrated by Fig. 1 for the otherwise standard schedule. Starting from the origin it is known that a discrete period of time is required to initiate the formation of a weld nugget. For the very short times no adherence is obtained between the two pieces. As time is increased a small nugget is formed. Weld strength then improves rapidly with further increases in time, after which still further increments of time result in little additional strength. Precise shape of this time-strength curve depends upon the specific material and the force and current magnitudes.

Fig. 1 may be taken as a type relationship. Too much time slows down production, increases surface heat to the extent that electrode life is reduced and may cause weld interface molten metal expulsion. Optimum time from the viewpoint of both weld strength and consistency is within the C to D range, Fig. 1. For the 0.095-inch stock under consideration, this is between 19 and 31 cycles for the force-current conditions used, which is the range for producing the strongest welds with the least variation between individual values within each group.



Current—General influence of current only, upon weld strength and consistency is shown in Fig. 3 for the same material, when using an otherwise standard schedule. The current-strength characteristics are similar to those shown in Fig. 1 for influence of time upon strength, except that they are more pronounced. This is in line with the heat equation which shows time to be a first power and current to be a second power variable.

Within the A-B range in Fig. 3 no weld is formed. Within the B-C range abrupt changes in strength occur with small variations in current and within the rather narrow C-D range is therefore the optimum operating range from the standpoint of resultant strength and consistency. Line voltages are subject to fluctuations and these changes cause currents of different values to pass through the welding electrodes for a given machine and heat control setting. A schedule employing currents just less than the C value in Fig. 3 could not tolerate any current loss without complete loss of weld strengths. Use of a 11,750 amp value however permits a plus or minus 15 per cent current fluctuation without any appreciable variation in weld strength. The midrange current also produced welds of maximum consistency.

Current magnitude is the spot welding variable molten metal expulsion, distortion and often cracking. Currents higher than the value D cause overheating, which must be most carefully controlled, because of the second power effect in the heat generating equation. Even so, Fig. 3 demonstrates that it is possible with such metals as low carbon steel to preselect a schedule sufficiently insensitive to variations to permit a plus or minus variation of 15 per cent in current magnitude while maintaining full strength of the welds and with each subgroup consistent within itself to less than 5 per cent.

Electrodes—Influence of variations in electrode face dimensions only, are shown in Fig. 5 for the standard force, time and current conditions. These particular data are restricted to the 4-degree taper, since it is only with low angle tapers that such small initial point contacts could be used. For all small end electrodes, either conical or spherical in shape, the high unit pressures on the contacting ends tend to deform the electrodes after a few welds.

Values given are the strengths and consistencies prior to electrode deformation as would occur under extended usage. For the dimensions used, values less than the specified initial 0.26-inch electrode end diameter maximum produced strong consistent welds, but such electrodes would have a short operating life. Use of a too large electrode area results in insufficient current density (current per unit area) to bring the metal between (*Please turn to Page* 110)

Fig. 11—Example of control chart usage with known assignable causes. Spotwelds in low carbon 0.095-inch steel with schedule "O" except as noted

Improving Worker "EYE-FICIENCY"

By W. T. CAMERON

Increased production, reduced scrap losses and a better safety record are some of the benefits one large midwestern manufacturer derived from a scientifically conducted program designed to improve employees' vision

WITH production costs mounting steadily year after year, the need to insure peak efficiency of the individual worker becomes increasingly important. Studies made during the wartime years and since, have definitely established the relationship between a worker's seeing ability and his productive efficiency. There are many ways in which a worker's vision can become impaired, and such impairment can directly influence two vital factors. First and foremost, the quality and quantity of production may be lowered, and secondly, the worker with poor vision will tend to have more accidents, which will increase over-all operating costs.

Number of workers who are visually handicapped in any one company may range from 10 to 60 per cent, but on the average, one out of three employees will be found in need of visual care. The statements above have been substantiated by numerous studies, but these problems still remain for any individual company; to what degree are our employees handicapped by visual difficulties, how can we aid them to obtain visual improvement, and will the results justify the effort.

Plan Followed—Many companies in all types of industry have attempted to solve these problems. Detailed below is a report of how a large midwestern manufacturing company proceeded, the factual results obtained, and conclusions as to the value of their efforts.

Steps followed by the company: 1. Set up a method by which employees with visual difficulties could be discovered. 2. Organize a simple, efficient system through which employees could be aided to obtain visual improvement. 3. Obtain employees' co-operation in following steps 1 and 2, and in wearing corrective-protective goggles they need in eye-hazardous areas.

To attain these three goals in co-ordination with a sound industrial personnel policy, the company in November, 1947, enlisted the aid of American Optical Co. which offered the following services:

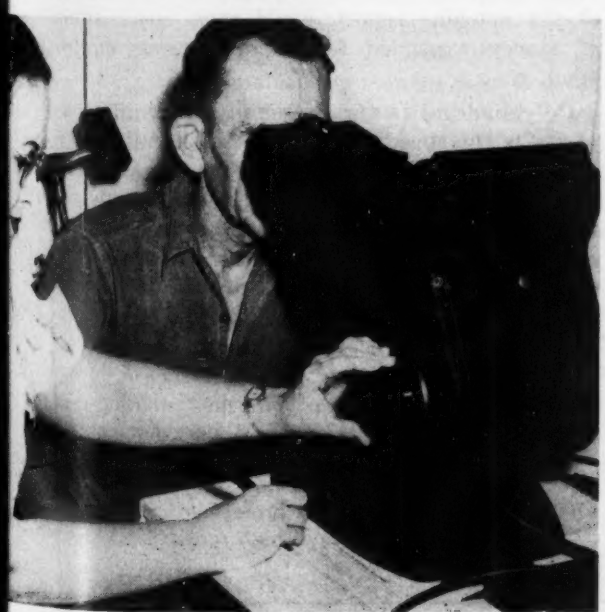
1. Use of a scientific sight-screening instrument.

2. All necessary printed materials to be used in recording and analyzing the steps, encouraging employee co-operation, and promoting professional participation.

3. Aid of industrial visual consultants to train personnel in the use of the instrument and program procedures, and to advise company management on the best methods to be used in obtaining employee co-operation.

Health and Vision—Because an employee's vision concerns his health in a direct manner, as well as affecting his individual efficiency, the medical department handled both the screenings and their analysis. The company doctor interpreted the readings, made referrals for further attention when necessary, and the nurses scheduled appointments for those employees in need of visual care.

The AO sight-screener was taken to all factory departments on all shifts and the employees were tested in their own departments. All applicants for work were tested as part of their preplacement examination. The eye check was also introduced as part of the annual physical examination which is given to all supervisory personnel, and to all persons over forty. After the record cards were completed and analyzed, they were filed with the individual's health records. Following a period of trial testing, the formal program was officially begun.



American Optical Co. sight-screener used in the vision program described in this article

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Within 4 months, the bulk of the employees had been screened, and those in need of visual care had been notified.

Ability to see at work depends upon more than *acuity,* or the sharpness of vision, measured at 20 feet by a wall chart. The AO sight-screener is designed to produce a record of visual performance under conditions equalling distance seeing and near or close seeing for the following functions: 1. Simultaneous single binocular vision or the ability to see with both eyes at the same time. 2. Right eye acuity, 3. left eye acuity, 4. binocular acuity, 5. stereopsis or depth perception, 6. vertical muscle balance of both eyes, 7. lateral muscle balance of both eyes.

In the field of visual care, there are three groups of persons—ophthalmologists, optometrists and ophthalmic dispensers (opticians)—who provide the professional and technical services leading to better vision.

Vision Specialists—In the program reported here a panel of five vision specialists was selected. These specialists were familiar with plant operations and had expressed a willingness to participate. For any employee whose job required eye protection, and who was discovered to be in need of visual care, the company paid for the professional services, if he went to one of these five specialists. The employee was also permitted to see any other vision specialist, in which case he paid for the professional services himself. (*Please turn to Page* 106)

Mercury "Brushes" Used in AIR-DRIVEN GENERATOR

WHIRLING at 17,000 revolutions per minute with energy supplied by a jet of compressed air is the copper flywheel in an electric generator developed at Case Institute of Technology, Cleveland. Unusual in nature, the machine has brushes of liquid mercury instead of solid metal and coil "windings" which are not wound but cast of solid copper. No iron is employed in its magnetic circuit.

A rotating disk generator invented by Faraday in 1831 furnished the principle for the new development.

Adjustments being made on the whirling-disk generator, the heart of which is beryllium-copper disk which rotates at almost 300 mph. Note the steel and timber barrier around the section containing the disk. It provides protection in the event the disk shatters at high speeds

In a conventional generator, the mechanical energy of the revolving rotor is taken off as electrical energy through copper or carbon brushes rubbing on the rotor. In the air-driven machine, the energy of the whirling disk is so great that, in order to eliminate loss, jets of liquid mercury are used for brushes.

Strength of Tool Steel—Beryllium-copper is the material of which the 5¾-inch disk is made. An alloy of almost 98 per cent copper, it is said to have a strength similar to that of tool steel. A jet of compressed air blowing against "buckets" cut into the disk turns it at speeds of almost 300 miles per hour. The generator is said to have already developed a magnetic field 6000 times as intense as that of the earth, this appearing to be below its capacity.

Possible use of the machine, which generates a huge magnetic field at a low cost, is expected to be as the magnetic core of a betatron or other atom smasher. Such a development, developers of the machine report, could save large sums of money expended for energy-storing equipment.

Only limiting factor present in the unit's capacity is the speed at which the disk will rotate before it flies apart. To prevent an accident if it should shatter, the experimental model is surrounded by a heavy barrier of timbers and steel seen in the illustration. Special equipment is required to dispose of the poisonous mercury vapors developed.

THEY CAN RUN THEM: I am inclined to believe that more topflight executives in the machine tool industry have intimate, first-hand knowledge of the products of their companies, than is the case in any other comparable business.

This was impressed upon me in the course of a recent showing of improved machine tools at the National Acme plant in Cleveland. When I came into the display area, I found Charlie W. Simpson, executive vice president; Richard C. Kinley, vice president and works manager; and Robert R. Rhodehamel, general sales manager, eloquently describing the workings of a new model single spindle automatic to attentive groups of visiting production executives.

These visiting production executives were interested not only because the machine itself is worthy of interest, but also because they recognized that their National Acme hosts really know what they are talking about. Like many other machine tool men, Charlie Simpson, Dick Kinley and Bob Rhodehamel could take off their coats, roll up their shirtsleeves and set up and operate the machine they were describing.

Wives of machine tool builders often complain that their husbands bring home chips in their rubber heels which scratch polished floors and oil on their shoe soles which tracks up rugs and carpets. Those things are just as much the "hallmarks" of men who have grown up in the machine tool business as hayseeds and aroma of the stable are of men who like horses.

Since machinery users put well merited trust in all these builders who are so thoroughly "at home" out in the shop, about all the wives can hope to do is to make their husbands change their shoes before coming into the house.

MAPI REPLACEMENT MANUAL: While a guest at the recent Detroit meeting of Machinery and Allied Products Institute, I heard informal discussion of a book about to be published by the Institute, on theory and practice of industrial equipment replacement. Thanks to Donald M. Pattison, vice president in charge of sales, Warner & Swasey Co., Cleveland, I now have an advance copy.

MAPI Replacement Manual for Attainment of a Dynamic Equipment Policy, is built around a widely accepted replacement formula developed by George Terborgh, research director of the Institute. Simply stated, this formula enables top management to determine when a machine tool or other piece of manufacturing equipment is "economically dead". It gets away entirely from hunch and rule-of-thumb methods, described by William J. Kelly, president of the institute as "specimens of industrial folklore handed down from one generation of managers to another".

The book is the result of three years work on the part of George Terborgh and 22 representatives of industry. Among "machine tool names" in this co-operating group I recognize—in addition to that of Don Pattison: John R. Bartizal, Clearing Machine Corp.; Geoffrey G. Beard, United Engineering & Foundry Co.; Swan Bergstrom, Cincinnati Milling & Grinding Machines, Inc.; William L. Dolle, Lodge & Shipley Co.; Clayton Gaylord, Ingersoll Milling Machine Co.; A. F. Hardy, Norton Co.; James C. Hebert, Jones & Lamson Machine Co.; Donald J. Stewart, Barber-Colman Co.; Harry Thelen, Kearney & Trecker Corp.; and Herbert L. Tigges, Baker Brothers, Inc.

Also on this committee are: E. L. Andrews, Dresser Industries, Inc.; Robert C. Becherer, Link-Belt Co.; Walter S. Bencher, Combustion Engineering-Superheater, Inc.; E. M. Carver, Dodge Mfg. Co.; Fred W. Cederleaf, Borg-Warner Corp.; L. F. Crawford, Goodman Mfg. Co.; E. W. Deck, Morse Chain Co.; F. William Kahrl, Cooper-Bessemer Corp.; Henry S. Moore, Manning, Maxwell & Moore, Inc.; E. C. Spencer, Harris-Seybold Co.; and R. L. Wilhite, General Motors Corp.

Such a formidable array of talent could only be recruited by Machinery and Allied Products Institute, which is a federation of more than 30 trade associations in the industrial machinery and equipment fields. Organized in 1933, it devotes its entire attention to problems and opportunities of capital goods producers as a group and interprets impact of their activities on our general economy. *MAPI Replacement Manual* is an example of this good work. I recommend it highly.

SEEN AND HEARD IN THE *Machinery Field*

By GUY HUBBARD
Machine Tool Editor

QUEER SHAPED THINGS: Machine tool builders, tool engineers and production men are having to deal with a constantly increasing number of parts which must be machined to shapes far more complicated than anything designed by the use of T-square, 30 and 45 degree triangles and compasses.

Some of these parts have to do with reciprocating type aircraft engines, whose designers always did seem to be trying to outdo themselves in designing parts which are difficult to machine—not only from the standpoint of shape and frailty but also because of exacting demands as to fit and finish. That was true particularly during the war.

Gas turbines, turbo-jets and related "blowtorch" power plants have further complicated the situation by adding many more parts not only of bizarre mathematical shapes but also of materials which are well nigh unmachineable. Being designed to conform to theory of gas flow and to cope with extreme heat and corrosive factors, there is nothing for shopmen to do but to discover ways and means to machine these queer-shaped, tough and hard objects to specifications. Their ingenuity in doing so matches the abstruse brain work of the scientists who dreamed up these midcentury marvels.

This tendency toward queer shaped things in mechanical design is reflected in the automobile industry, in more efficient power plants and in various types of transmissions—hydraulic and otherwise. In these cases it does not reflect on the practicability of the designs, rather it is due to pressure for greater efficiency and easier control.

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FUNDAMENTALS OF STEELMAKING

NUMBER 20 OF SERIES

Another in a continuing series of articles on the making of steel and finishing it into products ready for the consumer. Each article is written by an outstanding authority in his particular field.

Production of Steel

By CHARLES W. BRIGGS
Technical and Research Director
Steel Founders' Society of America
Cleveland

PART II

ALL foundries do not use the same type of molding equipment because that which is used varies in accordance with the type of casting regularly produced.

In making a mold the pattern is placed in the flask (a metal or wood jacket) and sand rammed around it. In some cases a specially prepared layer of sand is placed against the pattern face and then the flask is filled with regular molding sand. The specially prepared layer of sand is called facing sand and the regular sand is called backing sand.

The pattern, or its component parts, are so placed in the flask that after the sand has been rammed around the pattern it can be removed without disturbing the impression it has left in the sand. The mold may be rammed in one, two or more parts and when the flasks are placed together they comprise the finished mold. Portion of the mold formed in the lower flask is spoken of as the "drag," while the upper portion is called the "cope." Intricate pattern designs sometimes require intermediate flasks known as "checks."

Molds are rammed with either hand tools, such as pneumatic rammers, or on various types of molding machines, such as jolt machines, squeezers, jolt-squeeze-strip machines, jolt roll-over-draw machines, or sand-slinger ramming units with roll-over draw machines.

The mold having been produced, is then transferred to the core assembly floor or to a drying oven, depending upon whether the casting is to be poured in a green or a dried mold. A green sand mold is one which may be poured as soon as produced, whereas

Fig. 10—Sand cores produced by a core blower

In this concluding installment the author discusses molding operations, cores and their preparation, mold inspection and pouring, finishing operations, heat treatment, and inspection as apply to the steel casting industry

Castings

a dry sand mold requires removal of all moisture from the mold by a process of heating or drying.

There are other modifications of these two main types—namely, air-dried and skin-dried molds. Air-dried molds are of green sand that is permitted to air dry, and skin-dried molds are prepared by torch drying the mold cavity.

Mold drying temperature used in dry sand molding practice is usually about 450° F. Molds are dried in ovens that are heated with gas, oil or electricity. The molding sands that are to be dried may differ from those that are to be used in the green state, in that the quantity and type of bonding materials may differ and the moisture content may be higher.

Type of molds to be used are for the experienced foundryman to decide. His judgment will be based upon his knowledge of the method that will produce the best castings at the lowest cost. An intricate casting may best be made in green sand, since mold resistance to the normal concentration is less than would be in a dried sand mold. A dry sand mold would probably be used if the casting is large and heavy because it offers high strength properties and can better withstand both the metal weight and pouring erosion.

During mold preparation an opening extending from the exterior into the cavity is provided so that it can be filled with molten steel. This opening is known as the "runner" and the place it enters the casting is called the "gate." Also, at the time the mold is prepared, additional cavities are placed at strategically located positions connected to the mold cavity. These openings will be filled with molten metal and they are known as "risers" whose function is to provide reservoirs of molten metal for the casting to draw on during its period of solidification.

Steel contracts approximately 3 per cent in volume when it passes from the liquid to the solid state. In order that the casting may be free from shrinkage cavities, it is necessary that during solidification, molten metal be drawn into it from an outside source. Thus, to forestall cavity formation, foundrymen provide reservoirs of molten metal at suitable locations. These reservoirs, which are not a part of the casting but essential to its integrity, are removed during the cleaning operation.

Some steel castings are designed in such a manner that it is impossible to provide risers to feed certain sections. These sections are produced free from cavities but rapidly solidifying the section through

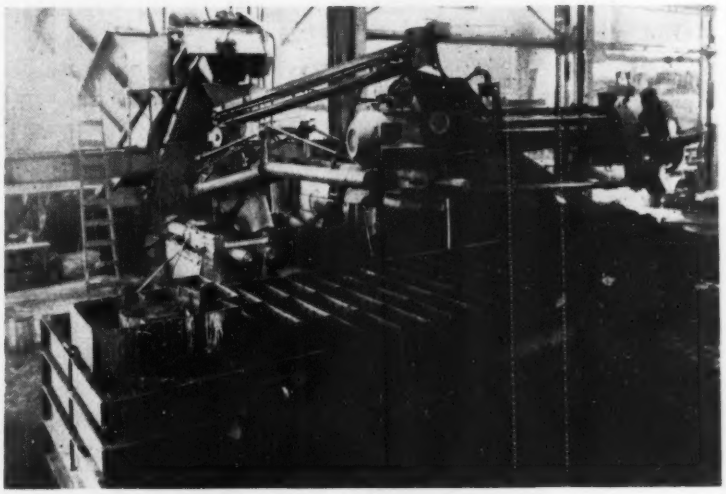

Fig. 11—A sand slinger in operation

Fig. 12—Cores for gear boxes

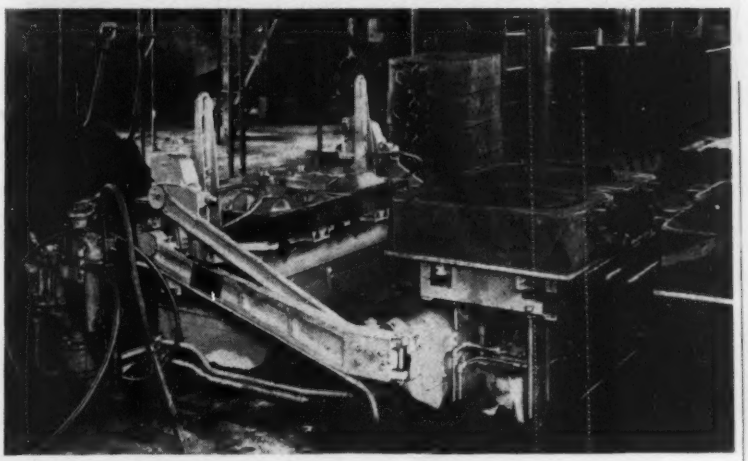

Fig. 13—Molding on a jolt-rollover machine

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use of metal chills placed in the mold walls or within the mold cavity.

Cores are component parts of a mold and used to form the casting's internal passages. For example, to make a hollow metal cylinder, one would use a solid cylinder pattern which would produce a mold with a cylindrical-shaped cavity. Then, a sand core would be suspended in the center of the cylindrical cavity to prevent the metal from filling the space occupied by the core. In other words, cores are usually made of baked sand and inserted in the mold cavity to provide passages in the finished casting which will conform to the plans as required by the particular casting design.

Requirements for a good core are as exacting as those for a good mold. Core material must be very refractory since in some cases metal will nearly surround it. The core must be sufficiently strong to withstand normal handling without being so strong as to prevent metal surrounding it from contracting normally. A good core should break down or crumble as soon as it has completed its primary purpose of displacing the metal, in accordance with the design features.

A core should be so constructed as to permit gas which is formed to pass through vents in the core and mold body to the surrounding atmosphere. Also, a core must be constructed so that it may be easily removed from the casting after cooling.

Most cores used in a steel foundry are constructed of sand bonded with a core oil, some solid organic bonding material and water. These materials are thoroughly mixed and prepared in a muller.

After core sand is prepared it is distributed to the coremakers, who either form the cores in core boxes by hand or by machine, depending upon the size and number of cores to be made. Production of cores is similar to mold production in that they are often made into two or more parts and pasted together. Many times in the modern foundry cores are made on core blowing machines, wherein compressed air is used to force sand into the core boxes.

Fig. 15—Preparation of a pit mold

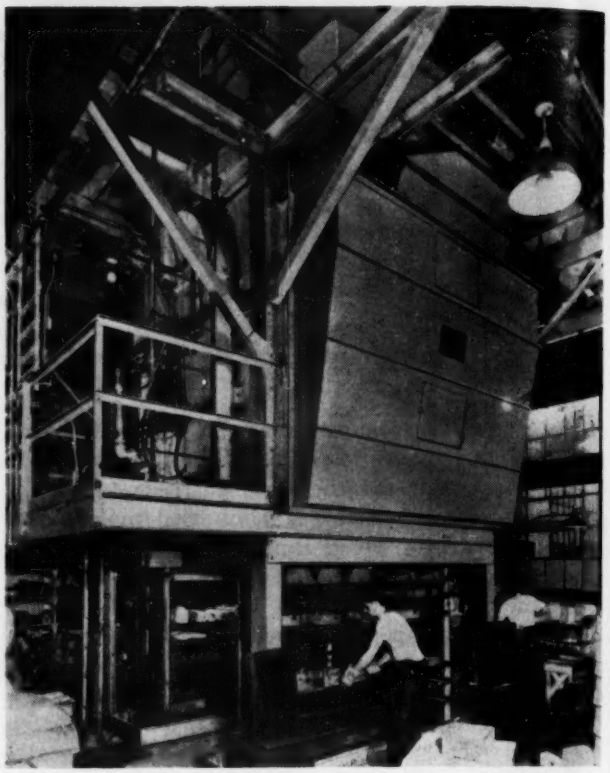


Fig. 14—View of a vertical or tower type of core oven with forced cooling system

The operation following molding of the core is one of drying or baking. Cores are placed in ovens and baked at temperatures of 350 to 450°F for a time interval which will insure the desired properties in the core. All cores require careful checking as to dimensions and pattern conformity before they are sent to the mold assembly floor.

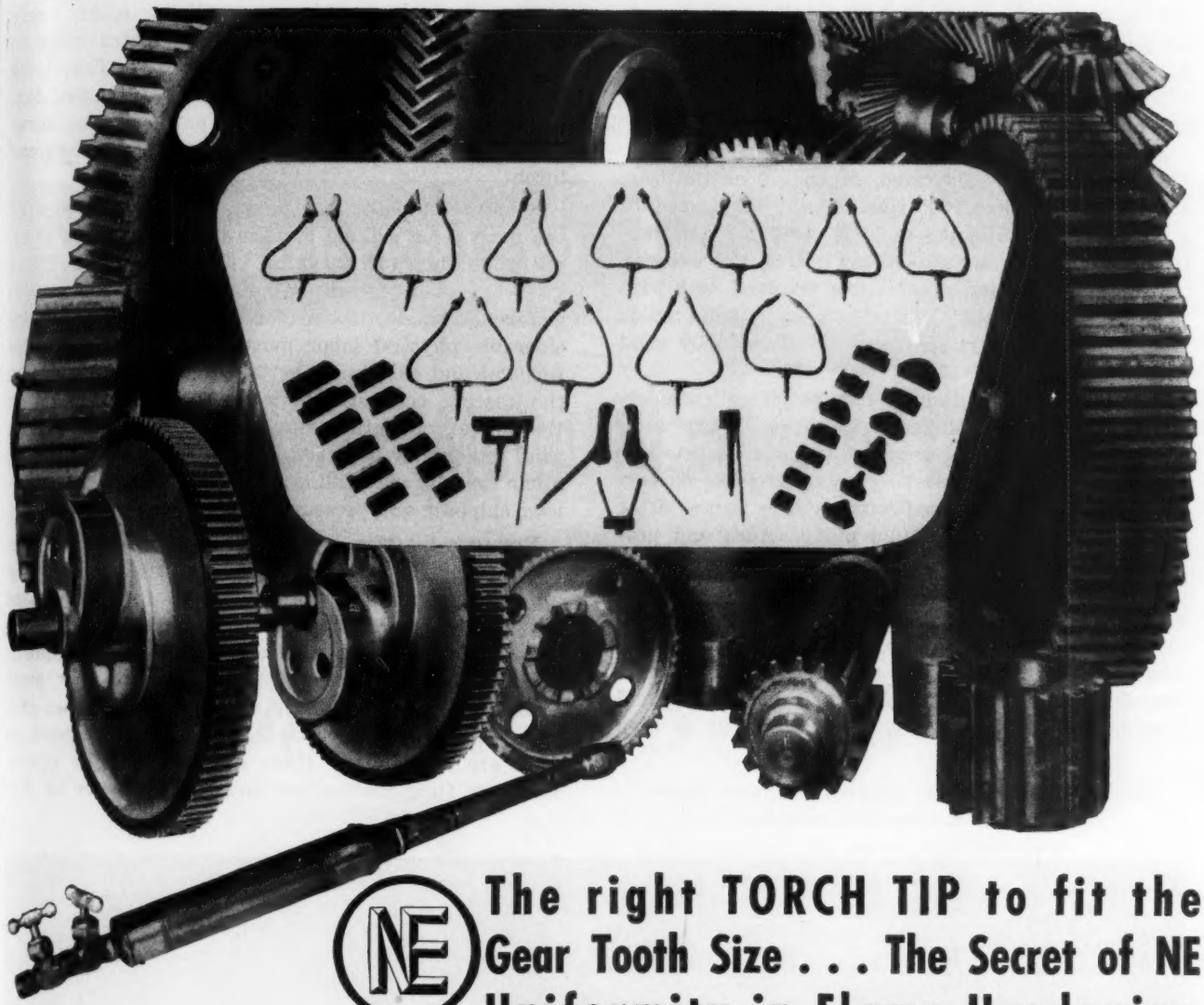
There are many modifications of coremaking procedure depending on how and where cores are to be used. In some cases, cores are made of green sand, air-dried; in other cases half of the core may consist of a baked oil sand and the other half of green sand.

The cores, having reached the molding assembly floor, are set in their proper places within the mold cavity. Small cores are placed by hand, while large ones may require mechanical equipment and a crew of men to set them in place.

In some cases the entire mold cavity is constructed of cores. This practice is used when casting design is such that the pattern, because of surface irregularities, cannot be drawn from the sand. Also, large molds, upward of 100 feet in length, may be produced by assembling cores in a pit mold.

The entire mold is inspected and checked after the cores are set to see that proper clearances have been provided, metal sections maintained, and cores properly placed. Then sections are put together, the cope being placed on the drag, and the entire assembly securely bolted or clamped together. The mold is now ready for delivery to the pouring floor to receive molten metal.

Metal is transported from the furnaces to the pouring floor in ladles. If large molds are to be poured, a bottom-pour ladle will be used and if the heats are



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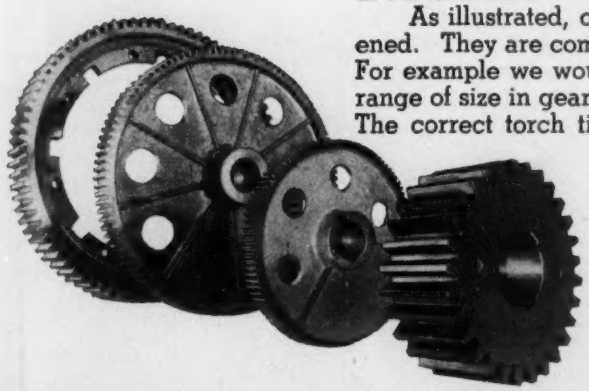

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not too large a teapot, or lip-pour, ladle will be used. Lip-pour ladles are placed on standards on the pouring floor and the metal poured into small shank ladles which are carried manually, or by monorail equipment, to the molds and poured.

Molds are also mounted in centrifugal machines. These machines are operated, depending on the type of casting, at 100 to 1000 rpm. Metal is poured into a central gate while the mold is revolving and centrifugal force throws the metal out to the exterior of the mold cavities. Molds are revolved both vertically and horizontally. In certain cases metal molds are used and internal passages are formed by sand cores.

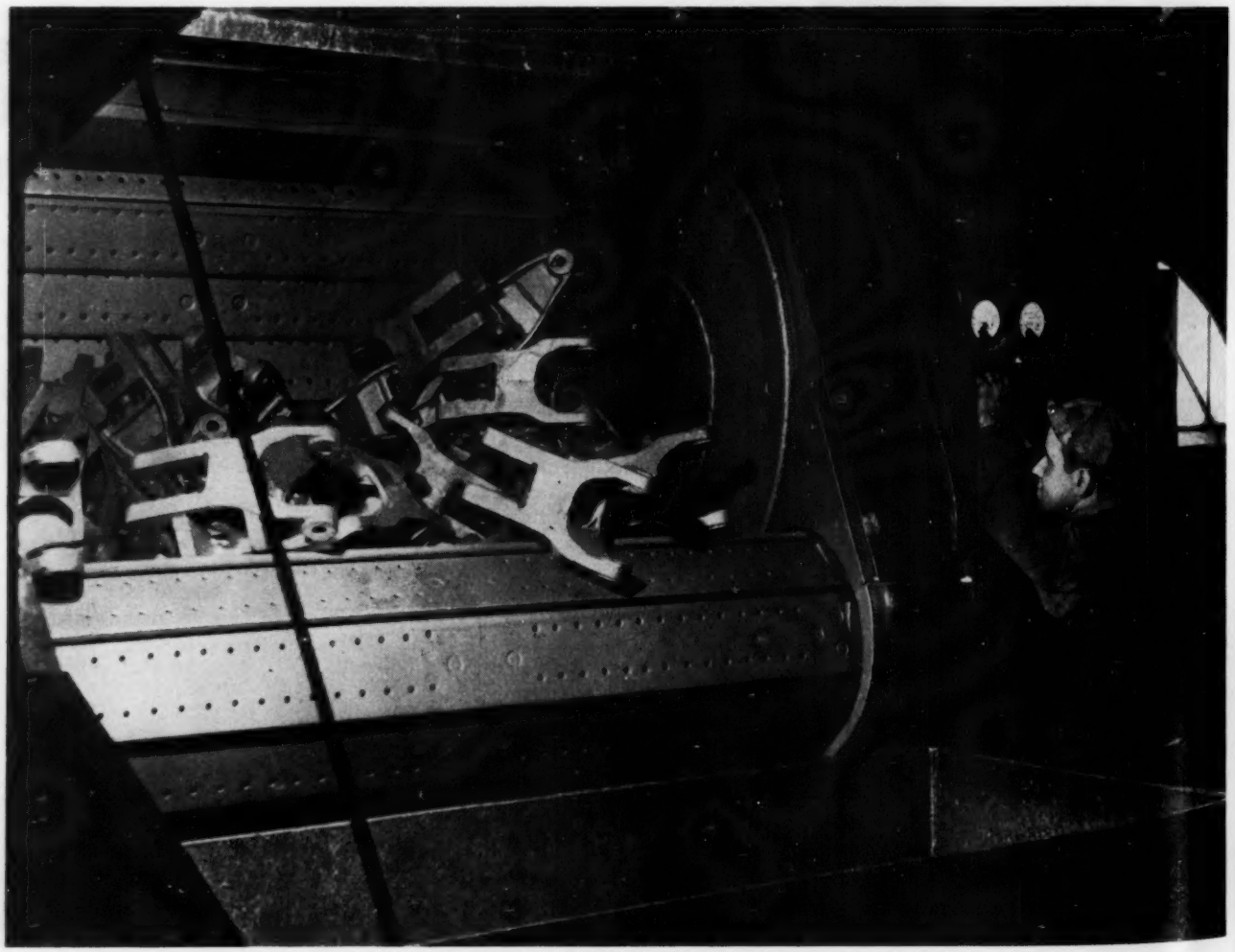
The pouring operation is one requiring considerable experience and diligent supervision. Metal temperatures are closely watched, pouring speeds are controlled and mold relieving operations are so correlated that they proceed with precise timing after pouring of the molds. Mold manufacture and production of castings are exacting operations requiring experience, skill and a high degree of technical knowledge on the part of the foundry personnel.

After the castings have solidified and cooled somewhat, flasks in which they are contained are transferred to vibratory shakeout machines and the sand jarred loose from the work. The steel castings then require certain finishing operations after being stripped from the mold. Risers and gates must be cut off and all adhering sand removed. The risers and gates are removed from the casting by sledging, shearing, torch burning, or cold sawing. The burning operation is performed with an oxyacetylene torch.

Removal of pads, fins, lumps and metal added for the purpose of making certain designs castable, is an operation known as snagging. Tools used in the snagging operation consist of electric and air-operated grinders, chipping tools and scarfing torches. Considerable physical labor must be expended in metal removal and care must be taken to grind or chip to the casting contour. In some cases, depending on the flow of work, the chipping operation precedes the sand removal or pressure cleaning operation, while in other cases it may follow. Most of the grinding follows chipping and pressure cleaning.

Pressure blasting is used to clean castings of adhering sand, to remove cores, to improve the casting appearance, or to prepare castings for subsequent painting, machining or assembling. There are a number of machines and methods capable of accomplishing this purpose, namely, metal shot or grit sand blasting, hydraulic cleaning and tumbling. Scale produced during the heat treating operation as well as sand are removed by these operations. The operations are fully mechanized and various types of ma-

Fig. 16—Pressure blast cleaning irregular shaped castings in a tumbling machine



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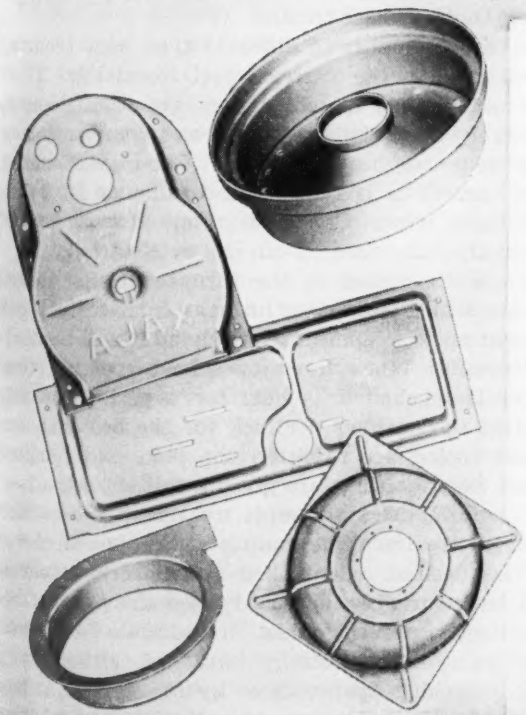

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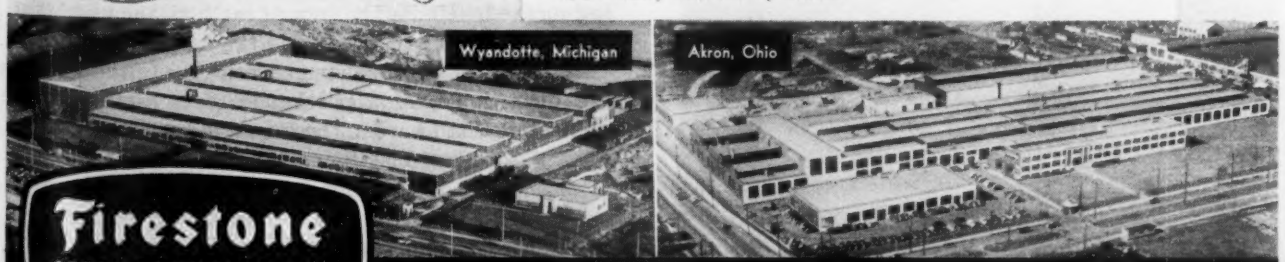

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chines are available to handle castings of all sizes. Castings that are tumbled are cleaned by shot or grit thrown at them by centrifugal force. Large castings are cleaned in rooms or cabinets by metal shot forced by compressed air from portable hose and nozzle units. Water and sand under high pressures are also used.

An important finishing operation is the checking of finished castings to see that they conform to the customer's required dimensions. In some cases, such as rangy castings or those having a considerable number of varying cross-sectional members, it is necessary to do some straightening or setting of the casting to dimensions. This often is necessary following heat treating operations since relief of casting stresses may result in some distortion of members. The operation of setting to dimensions is usually carried on under power presses using templates as gages.

Casting repair by welding is a finishing operation commonly used. Welders are employed in all foundries and careful control over welding technique and procedures is practiced.

Modern molding techniques and blast-cleaning methods have improved the surface finish so that most steel castings can be used satisfactorily in the exact condition in which they come from the foundry cleaning room. In some cases surface blemishes do occur. However, they are by no means harmful, especially since they can be thoroughly cleaned out by chipping and grinding and then welded. Steel castings can be as readily welded as wrought steel of similar composition. Moreover, welds performed on steel castings are stress-relieved or given a full heat treatment after the welding process.

In preparation of engineering structures, it is some times economically advisable to weld steel castings to other steel castings or to wrought products. The technique employed in the repair welding of steel castings and in the use of composite fabrication is the same as that employed in the welding of wrought steels.

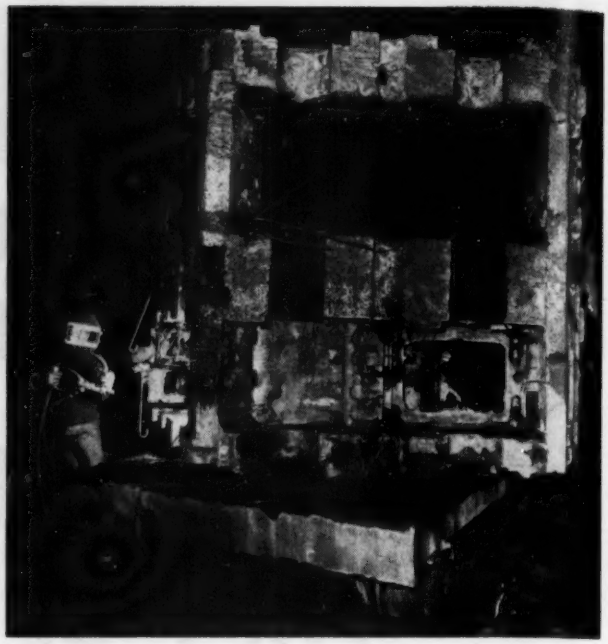


Fig. 17—Cleaning with sand and water blasting within an enclosed room

After the castings have received a preliminary cleaning, they are heat treated.

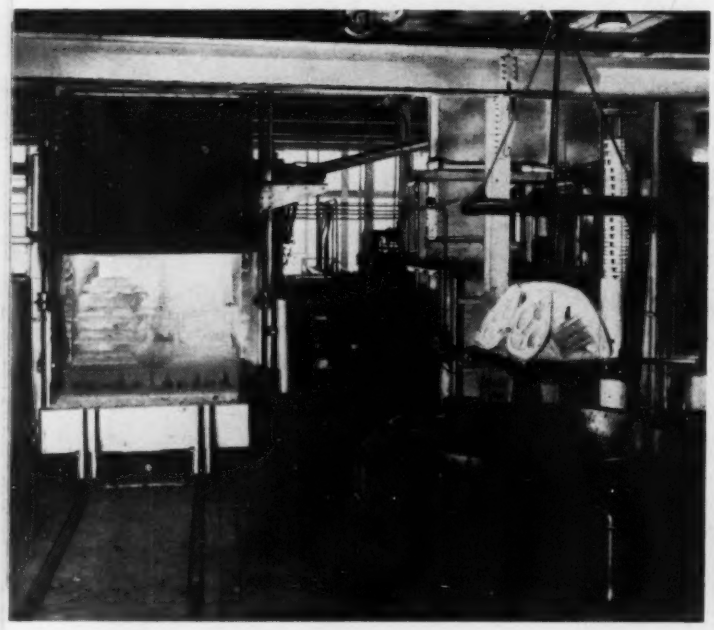
There are a number of different type heat treating furnaces used in the various steel foundries. Their design and method in which they are used depends considerably upon the size, shape and composition of castings requiring heat treatment. Car-type furnaces, pit-type, hearth or box-type and continuous furnaces, are all being used. Capacities range from 1 to 100 tons and they are fired by oil, gas or electricity.

Castings are placed in the furnace or distributed upon cars which are rolled into the furnaces. Work is brought up to temperature slowly so it will be heated uniformly. When the proper heat treating temperature is reached it is held for a period, usually equivalent to one hour per inch for the heaviest section and cooled according to the plan and purpose required. Steel castings are given a full anneal, a normalize, a normalize and temper treatment or a quench and temper treatment, depending on the type steel and properties desired. Controlled atmosphere furnaces, or salt bath furnaces, are used when the product requires them to prevent oxidation and scale formation.

Castings are differentially hardened, either by a partial quenching operation or by the flame hardening method. Under the former method, the usual heat treating furnaces are used and the castings are heated uniformly to the proper temperatures. In the quenching operation only a portion of each casting is immersed in liquid with the remainder of the casting cooling in air. The flame-hardening process is one in which an oxyacetylene flame is played upon the surface to be hardened and immediately thereafter a water spray is applied, or the casting portion requiring hardening is heated by induction and the entire piece given a water quench.

Steel castings may be given a carburizing, nitriding

Fig. 18—Heat treatment of steel castings employing a liquid quench



REPRINTS AVAILABLE

REPRINTS of previous individual chapters in the series "Fundamentals of Steelmaking" now may be obtained by addressing Readers' Service Department, STEEL, 1213 W. Third St., Cleveland 13, O. Prices range from 20 to 75 cents per reprint. Subjects covered over the past few months include:

No. 1, Production of Electric Arc Furnace Steel; No. 2, Scrap Iron and Steel; No. 3, Production of Open Hearth Steel; No. 4, Production of Tool Steel; No. 5, The Art of Roll Pass Design; No. 6, Production of Bessemer Steel; No. 7, Production of Metallurgical Coke and Resultant Coal Chemicals; No. 8, Production of Plates; No. 9, Production of Hot and Cold-Rolled Strip and Sheets; No. 10, Production of Tin Plate; No. 11, Production of Structural Shapes and Rails; No. 12, Production of Butt and Lap Welded Pipe, Conduit and Electric Metallic Tubing; No. 13, Production of Pig Iron; No. 14, Production of Seamless Steel Pipe and Tubes; No. 15, Production of Stainless Steel; No. 16, Iron Ore—Its Mining, Beneficiation and Reserves; No. 17, Transportation and Handling of Iron Ore; No. 18, Production of Wire and Wire Rods; No. 19, Production of Gray Iron Castings.

or cyaniding treatment. Typical batch-type carburizing furnaces and nitriding equipment are used while cyaniding is carried on in the usual type of commercial cyanide bath.

Most popular quenching medium used in foundries is water, although some oil quenching is done. Usually the castings are tempered following the quench at temperatures between 1000 and 1300° F. Tempering is carried on in car-type, hearth or recirculating air-draw furnaces. Operations are similar to those employed in the heat treating of wrought steel products and the details need not be discussed here. Information on process control employed can be secured by referring to references 1 and 2. Castings are pressure blasted following the heat treating operation.

Steel castings are given a careful inspection before they are shipped. Steel foundries maintain complete inspection departments, not only for detection and correction of imperfect material and workmanship, but also for purchased materials and equipment.

All castings are given a visual examination to ascertain whether the product fulfills requirements of both the foundry and customer. It is checked for surface appearance, proper dimensions and to insure that wall sections are of the desired thickness. Cored areas are studied and templates used to check them against the drawing requirements.

The purchaser may specify one or more inspection tests on a casting. Character of the inspection depends on the casting's service requirements. For example, a small pulley may need only visual inspection, whereas a turbine casing may require visual examination, a determination of mechanical properties and a chemical analysis of the steel, radiographic and magnetic particle testing and certain pressure tests.

The inspection department performs the testing for chemical analysis and mechanical properties. Coupons or test blocks, that are either attached to the casting or cast separately at the time of pouring, are machined into standard tensile test specimens. Tensile strength, yield point, elongation and reduction of area values are obtained for the steel. Also, bend tests and impact tests are run, if specified. The casting also may be tested for hardness, and in some cases, certain special tests, such as for torsion, fatigue or corrosion, are performed. Microstructure of the steel may be studied as to grain size and inclusion content and metallurgical changes followed through the heat treating operations.

Steel is still steel whether it is cast or wrought, and therefore the mechanical properties of the two types are similar providing the composition and heat treatments are alike. Wrought steels have slightly higher ductility in the direction of working than cast steels, but then, transverse direction properties are lower. Cast steel has uniform properties in all directions. Since properties are similar, no attempt will be made to list the numerous test results that can be secured from cast steels of varying carbon and alloy contents or from different combinations of heat treatments. For detailed information the reader is directed to the *Steel Castings Handbook*.[1]

Pilot castings are made when the product is ordered in quantity. Imperfections are quickly detected in the sample castings through design tests, strain gaging, sectioning or nondestructive tests. Steel castings are purchased in large quantities by the railroads from various foundries and it is important that the gaging practice be very complete to assure interchangeability in use. Numerous gages are used on these castings to control important dimensions.

Occasionally, the purchaser specifies that a casting or several castings, depending upon size of the order, are to be tested to destruction. These are then placed on an anvil block and broken by dropping a heavy metal ball from a sufficient height and the broken sections examined. In some cases a metal saw is used instead of a drop ball. This procedure, although slower, allows the casting to be sectioned systematically.

Testing to destruction is not an economical inspection method for miscellaneous castings. Nondestructive testing is today supplanting destructive testing, even in the inspection of large quantity production jobs.

There are three types of nondestructive tests: Radiography by either radium or x-rays, magnetic testing, and various pressure tests. In some cases there is a need for using all three tests on a single steel

Fig. 19—Radiographic examination of steel castings by the use of radium

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casting. Through radiographic inspection it is possible to examine the interior of the piece by photographic means. Magnetic testing reveals hairline surface cracks, not discernible to the naked eye, and discontinuities close to the surface. Practically all pressure castings are tested under compressed air, oil or hydrostatic pressure as a precaution against leaks, even though they had previously received radiographic inspection, since in the case of large castings it is not economical to inspect every portion by radiographic means. Radiography, however, offers much broader information than can be obtained from the other two methods of nondestructive testing. Of the two types radium radiography is used by the steel casting industry to a greater extent. Reason for this is that radium is portable; it is its own power plant and can be used any place in or out of the foundry. Also, radium radiography has great latitude. It can produce acceptable radiographs at positions of changes in sections which are often critical stress points in metal structures.

If a repairable defect is found during the nondestructive inspection, it is explored by chipping and grinding the casting at the indicated location. When the defective area has been removed, the section is repaired by welding. It is then reheated, pressure blasted and re-inspected.

The castings having been properly inspected, are now ready for shipment. In the shipping department they are weighed, painted or given a rust preventive coating, if required by the customer, and then packaged for shipment.

REFERENCES

1. *Steel Castings Handbook*—Steel Founders' Society, Cleveland, 1941 edition.
2. *Metallurgy of Steel Castings*, Briggs, C. W., McGraw-Hill Book Co., New York, 1946 edition.

Research Project Underway

Joint ASTM-ASME committee reorganizing for more effective attack on research problems

TO execute more effectively its various activities, the joint committee on effect of temperature on the properties of metals, functioning under the auspices of the American Society for Testing Materials and the American Society of Mechanical Engineers, is reorganizing its subcommittees and personnel. Always active in sponsoring technical papers and symposiums, this group has several papers and reports in process, including two symposiums covering "The Effect of Sigma Phase on the Properties of Metals at Elevated Temperatures" and "The Corrosion of Gas Turbine Materials". Each of these will include eight to ten papers and is scheduled for presentation at the ASTM annual meeting in Atlantic City in June, 1950.

The joint ASTM-ASME committee is headed by Ernest L. Robinson, structural engineer, Turbine Engineering Divisions, General Electric Co., Schenectady, N. Y., with Howard C. Cross, of Battelle Memorial Institute, Columbus, O., as secretary and Francis B. Foley as vice-chairman. Serving with these officers as the executive committee are Norman L. Mochel, manager, metallurgical engineering, Westinghouse Electric Corp., Philadelphia, and A. J. Herzig, chief metallurgist, Climax Molybdenum Co., Detroit. Panels and subcommittees of this joint group are: Finance, aviation, data and publications, gas turbine, general research, papers and meetings, petroleum and chemical, steam power, project 18—effect of manufacturing variables on the creep properties of steel—and project 29—stability of steels as affected by temperature.

To sponsor investigations leading to the accumulation, evaluation and dissemination of data on the engineering properties of metals at high and low temperatures and the standardization of test methods pertaining thereto, is stated to be the scope of this committee. Two existing standards are included in the committee's responsibilities covering recommended practices for short-time elevated-temperature tension tests and long-time creep tests. Other proposed standards are being developed, including one for stress rupture tests of metallic materials.

The joint committee is sponsoring the publication by the ASTM of a series of data and curves covering the high temperature creep and rupture strengths of wrought steels, including many of the highly alloyed and austenitic varieties. It is expected that the book, compiled by J. J. Heger and R. F. Miller of Carnegie-Illinois Steel Corp., will go a long way towards answering demands for authoritative information on many of the steels that have come into widespread use. Development of similar data on castings is under way. The committee also hopes to sponsor a three-year summary of the intensive studies recently carried out on the graphitization problem.

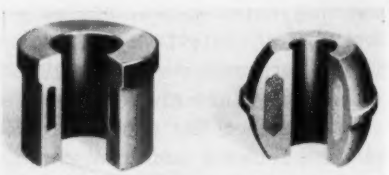
Welder Charges Batteries

ADDITION of a special rectifier to the Lincwelder 60 arc welder manufactured by Lincoln Electric Co. of Cleveland, adapts the unit for charging of any standard 6-v lead acid automobile type battery. It operates off the standard house light circuit fused for 30 amp. A discharged battery unable to turn over an engine can be given enough charge in 10 hours to start the engine, it is reported.

Bearing Has Oil Cavity

NEW type of oil-impregnated sintered metal bearing has a cavity of uniform size in the center of a bearing wall. As oil or grease is impregnated into the sintered metal by static pressure, it fills this cavity or pocket as well as the pores in the sintered metal body itself, resulting in a much greater oil content.

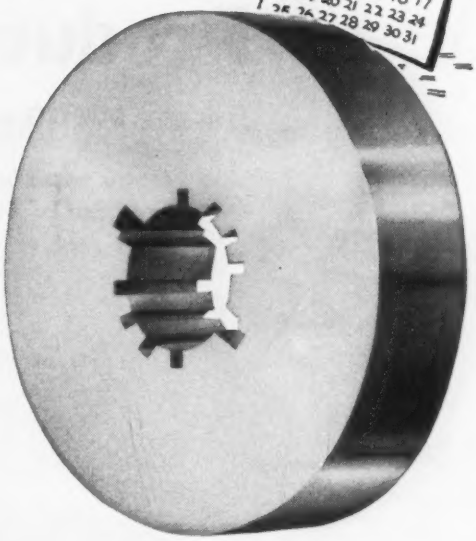
Known as the Haller oil well bearing and introduced by Michigan Powdered Metal Products Co. Inc., Northville, Mich., the increased lubricating quality of the bearing, together with a stronger bearing material, is said to make it possible for the bearing to take heavier loads and eliminate "freezing" under the most adverse operating conditions. As the oil is sealed in the bearing body, there is no dripping of oil.

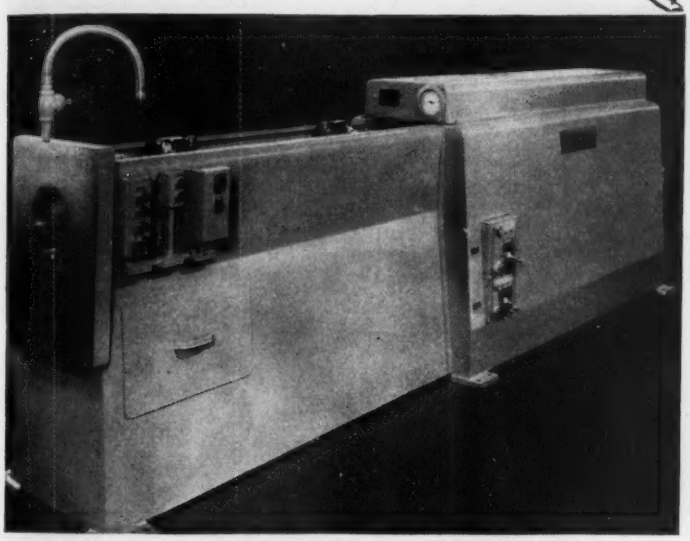


Bearings are supplied in three types: Pocket type which has an open cavity and is suited for heavy load bearings; sponge type with pocket filled with sponge iron to provide capillary action for oil retaining; thin wall, where a group of small holes replace the pocket so that the structure of the bearing wall is not weakened. It is reported that these bearings are adaptable to a wide range of applications.

IT USED TO TAKE A MAN A MONTH

IT NOW TAKES 15 SECONDS





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Styrian Iron Ore Production Increasing

DUE TO AUSTRIAN IRON AND STEEL PLAN

Made possible through the Marshall Plan, an extensive program of installing modern equipment for the mine at a cost of $2 million, will be completed sometime during 1951

By
BERGRAT ING. JOSEPH OBEREGGER
General Manager
Oesterreichisch-Alpine Montangesellschaft
Vienna, Austria

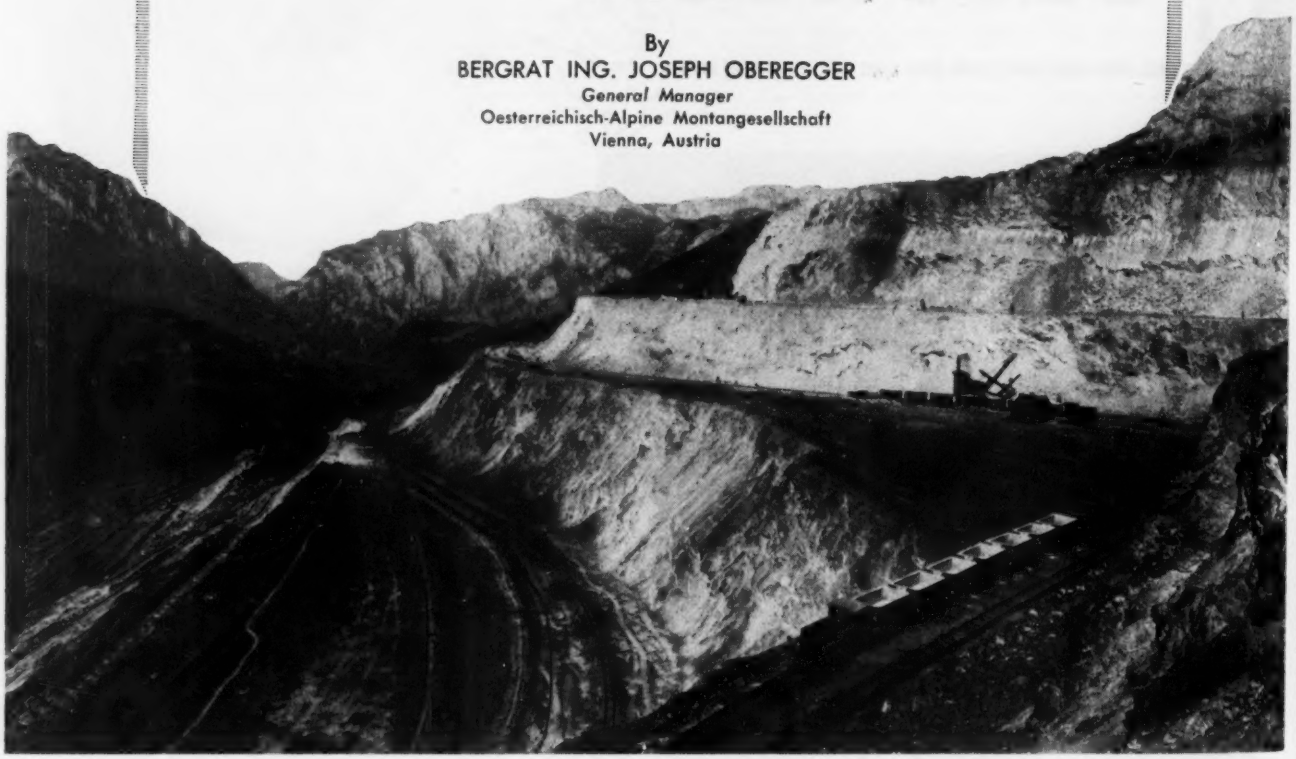


Fig. 1—Open pit mining terraces

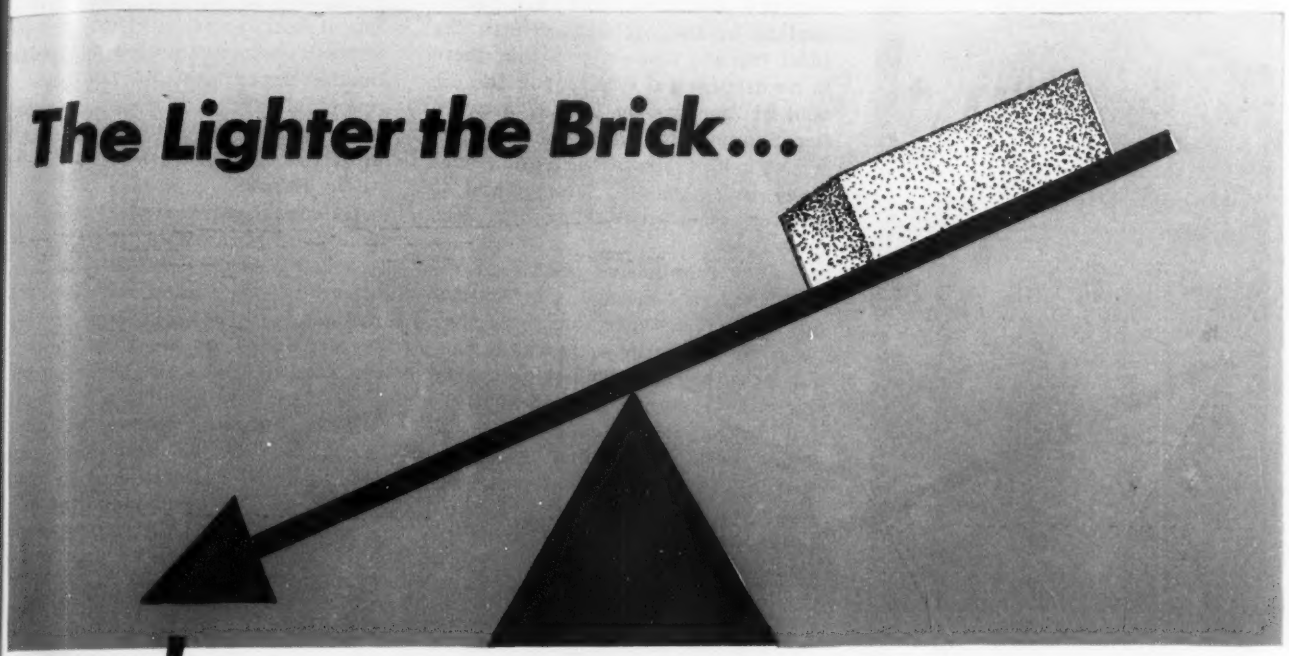
IN OUR generation, the steel industry of any nation forms the supporting pillar of its political economy. In the days of dim antiquity, it was generally believed that Northern iron was only obtained from the pure ore of the Styrian-Carinthian ore-mountain chain. History has shown that the Romans paid especial attention to mining and production of iron ore; as during the middle ages and also later at the beginning of modern times, these branches of the steel industry were highly developed. In our era of large scale manufacture, iron one mining has become concentrated in a few centers, of which the Alpine Works at Donawitz, Styria, plays a leading role in supplying Austria with iron and steel. Donawitz blast furnaces, producing excellent Styrian raw iron, famous for its purity, procure their ore mainly from the Styrian ore mine in Eisenerz.

During the latter years of World War II, the Styrian ore mine supplied iron ore at the annual rate of 2.5 million metric tons of 24 per cent pure iron. The collapse in 1945 affected the mine particularly severely because the new conditions necessitated a complete change of operational procedure in order to conform to the greatly decreased production, with the subsequent result that in 1945 and part of 1946, due to the ever diminishing number of ore purchasers as well as to extensive dismantling of the most modern mining equipment, this conversion process became more and more difficult. The work systematically carried out since 1945, resulted as early as 1948 in the remarkable ore production of approximately 1 million metric tons, while at the same time reaching and maintaining a quality of 24 per cent pure ore. During 1949, and for future years, a steadily increasing ore production is expected, which, according to the Iron Plan should, in 1950 reach 5.5 million metric tons.

Wasteful Mining Being Eliminated—The plans had to meet three fundamental requirements. The Austrian Iron and Steel plan specified the quantity of ore which the mine must deliver to the smelter. Plans, therefore, had to be so adjusted as to fulfill these requirements. Furthermore, depending upon location, and on correct mining practice, the planning authority had to carry out their program in such a manner as to eliminate all reckless and wasteful mining—which had been widely prevalent during past decades—and to mine so that future generations will not suffer the disastrous effects of former bad practices.

Intensive geological investigations,

The Lighter the Brick...



...the Lower the Heat Loss

The performance of an insulating firebrick is closely related to its weight. The graph illustrates this principle. It shows how you can profit by adopting the insulating firebrick having the lightest weight consistent with load and temperature requirements.

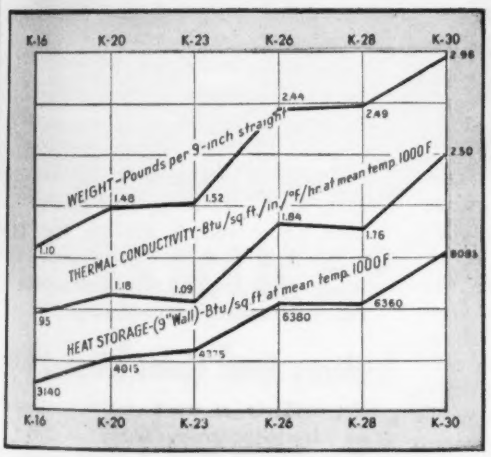


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Fig. 2—General view of the ore mountain at Erzberg mine

comprising numerous test-drillings and surveys, employing modern methods and extending back over many years, show that mining is done correctly only when 24 per cent pure ore is obtained and maintained; i.e. when the product delivered to the smelter, is composed of one part of iron and three parts of barren gangue, which will ultimately result in approximately 25 per cent pure iron ore.

Since it is common knowledge that by means of special conditioning the ore supply can be enriched considerably, a middle course was adopted whereby the iron and manganese content of the ore delivered to the blast furnace was so fixed that there is no detrimental effect upon the ore content; nor was the balance between beneficiation and smelting costs omitted. Finally, special attention was given to systematic mining, and in this respect extensive steps have been taken.

Based on intensive studies of the most modern American and Swedish ore mining methods, an investment program on a large scale was worked out, according to which the ore mine will receive during 1949 to 1951 the most modern equipment, having a value of $2 million and 30 million shillings. This extensive program was made possible through the Marshall Plan. Provision has been made for the purchase of the most modern electric dredges, heavy electric rack-type locomotives, scraping equipment, and dressing plants, as well as for the purchase of modern drilling equipment. After completion of this investment program, it will be possible to perform the work of ore-mining with modern machinery on an economical basis.

Of course, the realization of this time-limited program does not mean the end of ore-mining operations, but rather represents the wind-up of a certain stage of the planning.

Manganese Utilization Studied—In the ore mine itself, as well as in leading American laboratories, experiments are being conducted for the purpose of not only bettering beneficiation methods, but most particularly for improving the utilization of precious manganese contained in the ore. In various parts of the mine, new mining methods are constantly being tested on a large scale. Thus, magazine mining has shown favorable results. According to Swedish practice, new methods utilizing stope mining and blank mining by caving, are at present being studied extensively in Eisenerz from a theoretical standpoint; also an open-pit method, customarily used in Sweden. In the upper part of the mine a funnel-mining method is now being planned in order to test this method in actual operation for its usefulness in the Styrian ore mine.

Extensive experiments with flotation, conducted during the late war, are being continued. Current tests, according to this float and sink method, have resulted in a far better separation of ore from the barren gangue than when using the settling classifier.

The aforegoing proves beyond a doubt that in all directions everything possible has been done to create conditions which will make the mine a sound base of Austrian economy.

Fig. 3—Top terraces of the open pit mine. All photos AMSC

Installs Tubular Heaters

REMEDY for a high-cost manufacturing problem of Brooks Oil Co., Cleveland, was the installation of calrod tubular heaters on storage tank pipe lines. During manufacturing of extreme pressure lubricants for heavy industrial machinery, this heavy compound oil flows through a series of temporary storage tanks and because of its high resistance to flow, a temperature of 375° F must be maintained to keep it moving freely through the tanks.

Operating costs formerly were high due to high heat loss and uneven heat distribution until the heaters, made by General Electric Co., Schenectady 5, N. Y., were clamped to the base of each tank. This type of heater has also been wound around the pipe lines and covered with protective layers of sheet metal and asbestos to cut heat loss to a minimum.

Shows Steel Characteristics

WORKING characteristics of steels in temperatures from —300 to 2900° F and all important temperature zones, including hot-working, annealing, normalizing, stress relieving, carburizing and preheating for welding are clearly defined in Tempil Corp.'s latest "Basic Guide to Ferrous Metallurgy." Temperature ranges are shown in 19 colors approximating the characteristic hot-body radiant hues. At the right of the chart 23 fundamental metallurgical terms are defined and explained.

A diagram symbolizing the change in grain size with temperature is shown at the left. The plastic-laminated wall chart measures 16¼ x 21 inches and is available from the company, 132 W. 22nd St., New York 11, N. Y.

STRIKE?

no..they're out because of a broken bolt!

You're looking at a group of production workers who have been laid off temporarily—because a certain bolt in an all-important drive corroded to failure.

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"Eye-ficiency"

(*Continued from Page 88*)

The fitting and adjusting of the completed safety goggle was performed by or under the direction of the specialist who prescribed the correction. In this way better acceptance of the eye protection needed and co-operation in wearing on the job was achieved.

Ten months after the program began, the company evaluated the work that had been accomplished.

It was found that the company doctor had referred 280 employees for visual care out of a total of 1768, or 15.8 per cent. Eighty-three per cent of the persons referred had followed through after their referral and obtained the visual help they needed. By departments, the percentage referred ran from 9 per cent in one department to 33 per cent in other departments.

Efficiency Increased—Of those people who had been referred because of lowered visual acuity, 58 had only 83 per cent of normal visual efficiency, 40 had only 76 per cent, 40 had 64 per cent, 39 had 48 per cent and 65 had only 20 per cent of normal visual efficiency! Naturally these are the ones who received the most benefit from the program. Those persons whose vision was normal or better had the reassurance that their vision was in a healthy state, but those persons who had unknowingly suffered a sizeable reduction in visual ability were able to receive correction, and thereby, reduce their accident proneness and increase their visual efficiency.

Of those people who had been referred for an examination, the company found that 83.2 per cent of those obtaining correction had obtained safety goggle' prescriptions, which meant that the program had been successful in gaining co-operation among employees in the wearing of the protection they needed in eye hazardous areas.

This program has been worked into the company's personnel and medical procedures. To examine the results scientifically, all other factors other than visual improvement would have to be controlled, which in production operation is difficult to do. A number of encouraging results, however, indicated the extent to which visual improvement had contributed to more efficient company operation.

Scrap Losses Down—One of the primary measurements in the company's productive operations is the extent of scrap loss. Many millions of steel parts of all sizes are handled each day. The majority of these small parts have to be visually inspected at successive stages. It is important that at each step of the operations any flaws or defects should be discovered before additional work is done on the piece, and additional cost is added. Thus, it is vital that each inspector have good vision. Moreover each individual employee is, in a sense, a visual inspector to check his finished work.

The gratifying discovery was made in 1948 that over-all scrap losses were running 10 per cent less than in 1947! This represented savings running into tens of thousands of dollars. In a great measure, this was due to the improvement in vision throughout the plant. Moreover, it should be realized that this saving was made despite a marked step-up in production during the year. With the part that the visual improvement played, a great proportion of the credit goes to the increased vigilance of the employees, as well as the improved supervision and inspection throughout the factory.

Other important changes were noted in the year following the inauguration of the program, and though none of them can be directly credited to the vision program, nevertheless one cannot doubt the part visual improvement must have played in each of these.

For example, in 1948, accident frequency was reduced approximately 50 per cent. In an attempt to document the contribution of the vision program a special study was made on a group of employees who had the highest number of first-aid visits previous to their securing visual care. The visits of these employees were checked 3 months before they received visual care and for the 3 months afterwards. After receiving eye care, their first-aid visits dropped 51 per cent. In this group alone, the savings resulting from the reduction in visits amounted to a sizeable figure.

Better Safety Record—In another evaluation of the safety record in the year following the program's inauguration, it was found that the "lost time" accident cases were reduced from a total of 105 in 1947 to 71 in 1948. Certain of these can be almost directly attributed to an improvement in vision throughout the plant. For example, "cut or jammed hand" accidents dropped from a total of 20 in 1947 to 9. The "point of operation" accidents dropped from a total of 12 to 4.

In other words, throughout the plant a noticeable change for the better occurred in the safety record

STEEL HANDLING GOLIATH: Other types of materials handling equipment must feel like Davids alongside this Skylift giant, which Automatic Transportation Co., Chicago, says is capable of handling 60,000 pound coils of steel for Great Lakes Steel Co., Detroit. Each of two trucks delivered is 182 inches long, not including a 78-inch ram on which the coils are carried. Located 14 inches above the floor, the ram lifts the coils another 86 inches, making it possible to store the coils two high. In the demonstration shown, one of the units is lifting 60,821 pounds, which required an effort of 2,736,945 inch-pounds

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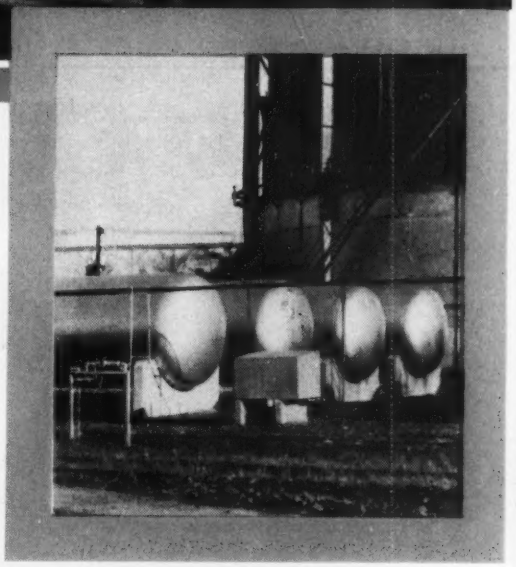

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and a large part of this gain was directly attributable to the visual improvement. Much credit goes to the increased efforts of the safety superintendent and the supervisors of the department, but their efforts were aided by this promotion of visual safety.

Through the use of the safety goggles incorporating the employee's prescription, the eye injury rate was substantially reduced. In one spectacular case, a previously unprotected employee who had just started wearing his prescription safety goggles received a blow on one of the lenses that, without question would have put out an eye. The broken lens in the goggles helped to dramatize the over-all effectiveness of eye protection throughout the plant.

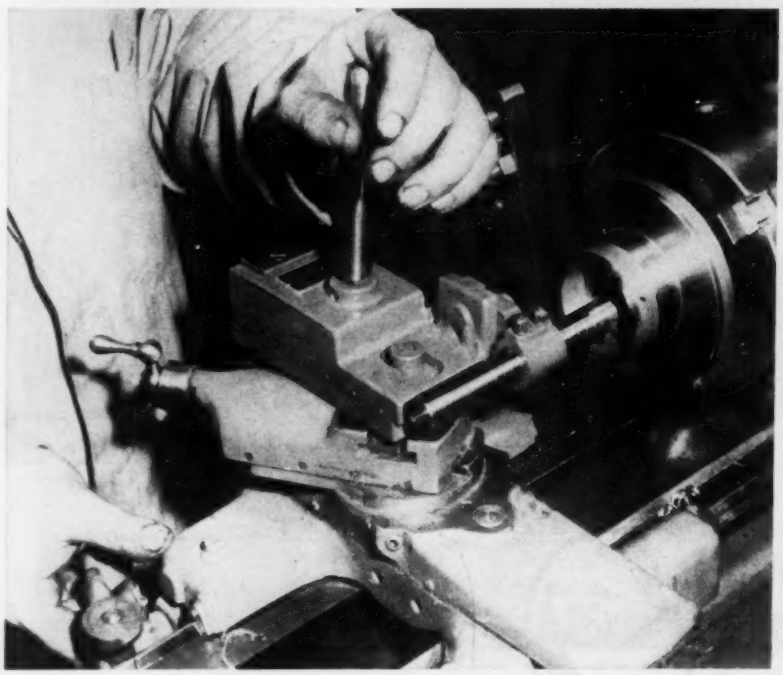
Steel Designed for Hot Work

A COMBINATION of chromium, tungsten, cobalt, vanadium and iron is being produced as B-47 hot work steel for shock and abrasion resisting applications at elevated temperatures. Although its good hot hardness permits the alloy to do any number of severe hot work jobs without washing out or changing size, its developer, Allegheny Ludlum Steel Corp., Pittsburgh, states that its specific application is where good toughness at relatively high hardness is required or where abrasion resistance and resistance to heat checking are important factors.

Product of the company's tool steel research laboratory at Dunkirk, N. Y., the new steel was in the developmental stage for about two years. It was subjected to severe laboratory and field experiments. It may be used for such applications as brass extrusion dummy blocks and dies, valve extrusion die inserts, forging die inserts, forging press dies and hot punch tools.

Highest Rated Switching Unit

AN INTERRUPTING rating of 10 million kva will be available for the first time on a regular power system when thirteen 230 kv switching units are installed at Grand Coulee Dam. Two of the units, made by General Electric Co., Schenectady 5, N. Y., have been in operation for several months at that power project. Especially designed and manufactured at the switchgear plant in Philadelphia, the thirteen units will be used to distribute power from 18 hydroelectric generators in two huge power houses to different points of the far flung transmission system of the Northwest Power Pool. If a short circuit occurs on one of the lines or buses, these generators, which will generate nearly 2 million kw of useful power can, with the help of other generating stations in the system, produce 10 million kva of short circuit capacity.



AUTOMATIC AND SIMPLE: Thread chasing, either external or internal, may be easily performed by the regular machine operator using a lathe attachment called the Meritool. It automatically retracts the lathe tool from the work at any desired setting and simplifies chasing of precision threads. It is reported by Motch & Merryweather Machinery Co., Cleveland, that small or large lot production can be done on an ordinary lathe with repeatable accuracy. Attachment is quickly mounted on any 9 to 14-inch capacity V-wayed lathe

Tables on Thermocouples

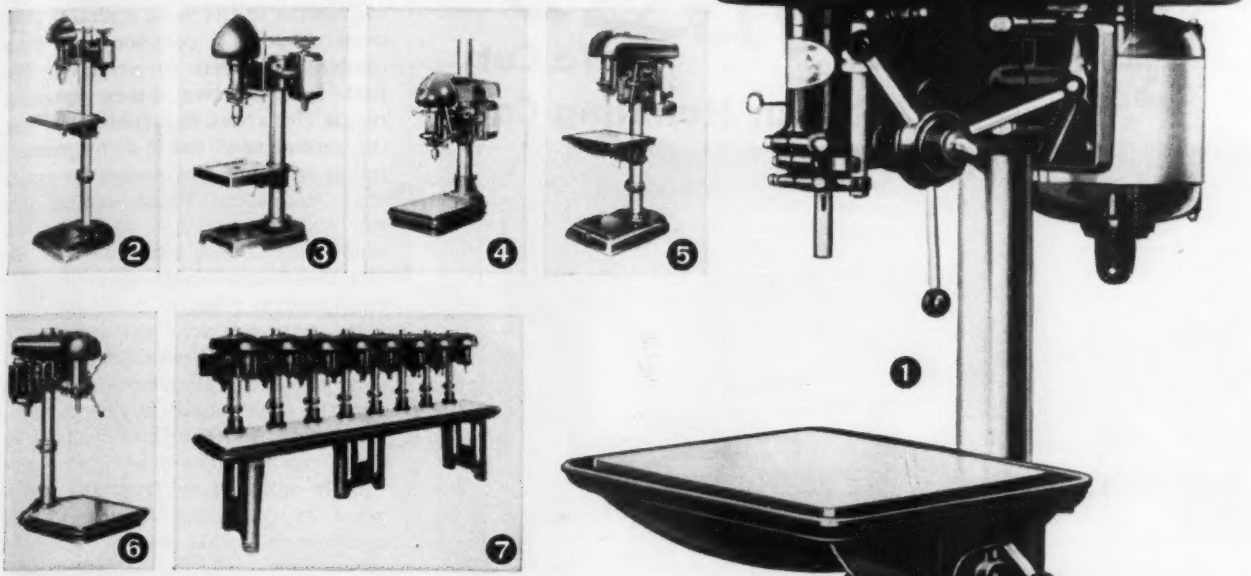
Part of an extensive project under way at the National Bureau of Standards

REVISION of all the common thermocouple tables is being undertaken by National Bureau of Standards, Washington, D. C., to take into account the recent changes in electrical units and in the international temperature scale. Present intentions are to publish eight tables giving the temperature-emf relations for platinum-platinum rhodium, chromel-alumel, and copper-constantan thermocouples in 1950.

Previously issued bureau tables have seen wide use, not only to convert thermocouple voltages into the equivalent measured temperatures, but also in the preparation of purchase specifications for thermocouple wire and in defining the relation between impressed electro motor force and scale reading for pyrometers which indicate temperature directly. In accordance with international agreement, the bureau adopted the absolute electrical units and began using definitions of the new international temperature scale of 1948, both in its own research program and in calibrating instruments for other laboratories and industries.

Emphasis is being placed on convenience for use in the preparation of the new tables. Explanatory text will be short, numerals will be as large as practical and the layout of pages and headings will be arranged to facilitate interpolation.

The following tables are expected to become available during 1950: Reference table for platinum vs platinum-10 per cent rhodium thermocouples; platinum vs platinum-15 per cent rhodium thermocouples; platinum vs platinum-13 per cent rhodium thermocouples; chromel-alumel thermocouples; copper-constantan thermocouples. Tables for iron-constantan thermocouples will not be revised until completion of an investigation into the properties of some commercially available thermocouples of that type.



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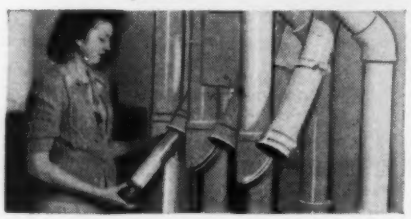

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Consistent Spot Welds

(*Continued from Page 86*)

the electrodes up to the welding temperatures.

Question of the most desirable electrode shape is a common one. Four combinations were investigated. The first involved two 3-inch spherical radius electrodes in combination, and the second used one 3-inch spherical radius with one flat across the entire body diameter. Third combination was with two identical 20 degree face taper ends having a suitable flat end and the fourth combination involved two identical 4 degree face taper ends with flat contact diameters. Fig. 6 shows that for the particular schedules employed, all shapes tended to give the least consistency on the thinner sheets. For the thicker sheets all shape combinations investigated were equally satisfactory from the standpoint of producing a series of 25 consecutive welds having a group consistency variation of less than 7 per cent.

It should be noted that the lesser consistencies (higher coefficient of variation) obtained from the 4-degree face electrodes on the thin sheets was partially the result of the lower pressures and shorter weld times. As thickness of material increases there is a tendency for decreasing consistency. Not all of these increases in consistency variation at the extremes of thickness for any of the the four Fig. 6 schedule and electrode shape combinations tested are chargeable exclusively to the electrode; the increases at both the extremes being partially the result of the force-time-current combinations used.

Combination of a 3-inch radius with a flat electrode to produce one approximately flat final exposed surface on the finished two-ply joint is shown to be suitable across the range up to ⅛-inch in thickness. This combination is desired in some shops because of ease of alignment.

Weld Spacing—All the preceding illustrations were for single welds. Production joints are made containing multiple welds. Depending upon conditions, more or less variation is found in the results as current shunting losses vary. Fig. 7 illustrates the results obtained with one schedule1 on ⅛-inch plate for three different welding times, all other conditions being constant. These tests were made by removing one welded specimen after each weld, following the first, was completed. While each point in that figure represents the strength of a single weld it is obvious that the consistencies of the 60-cycle welds within the joint would have been good while

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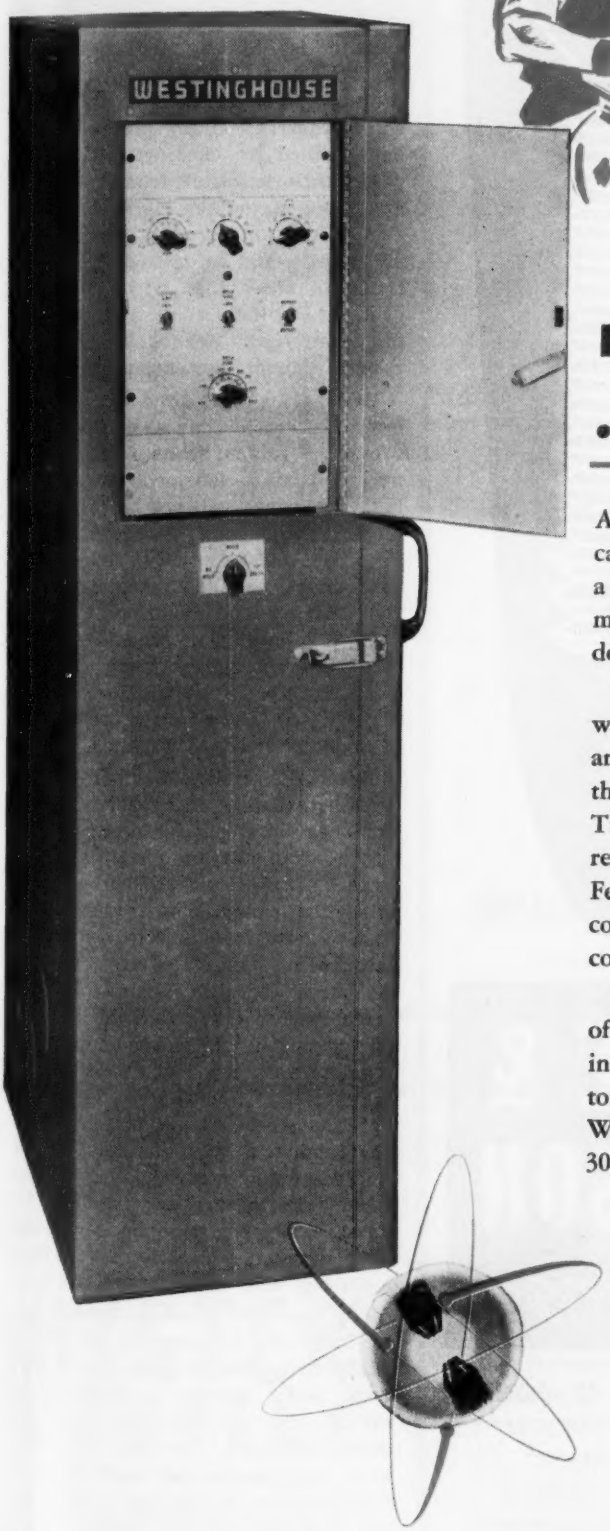

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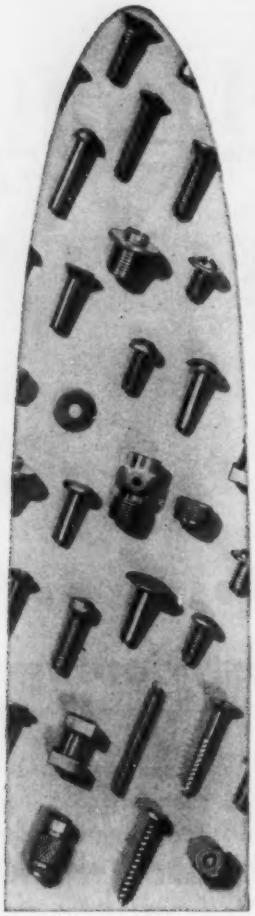

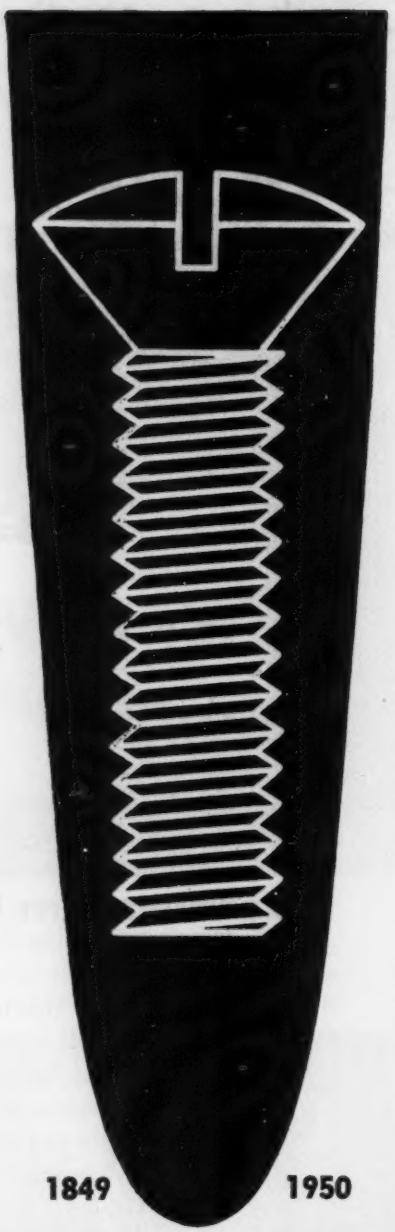

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that of the 20-cycle welds would have been poor, if the comparison were made upon a series of joints of the same materials involving different weld spacings. In this case the 60-cycle welds would also all have had higher strengths per weld than the 20-cycle welds.

Influence of increased welding time required to compensate for shunting losses as the result of close weld spacings is also shown by Fig. 7. If a setup is desired, for example, to provide a test control strength of 6000 pounds minimum per spot, it can be shown that this strength may readily be obtained or exceeded for single welds with times of from 20 cycles and more, as on the right of Fig. 7. For production speed a selection of 20 cycles would be desired. However, the data show that with this time even at 12-inch centers the minimum strength per weld of 6000 pounds cannot be obtained.

Using a 40 cycle time, spacings as low as 2.25 inches can be used without providing values below 6000 pounds per weld but welds made at variable higher spacings will not be consistent among themselves. Strengths ranging from 6000 to 8000 pounds per weld must be anticipated for such time-spacing combinations. When using a 60-cycle time schedule, higher strength welds are obtained throughout and there is very little variation in weld to weld strength, regardless of spacing down to 1½-inch.

Material Variables Temper—It has been established that spotweld tension-shear strength for a given weld nugget diameter increases with increased strength of the carbon steel as a given composition is work hardened.[1] Also, while composition or hardness of such steels are increased the direct tensile strength of the welds tend to decrease. Fig. 8 shows how strength and consistency were found to vary when spotwelding two thicknesses of 0.05-inch type 302 stainless steels of varying hardness, when using a schedule suitable for the softer tempers. Welding of the harder sheets was accompanied by metal expulsion and the conditions used were unsatisfactory for both operating and consistency reasons.

For annealed, one-fourth hard and one-half hard tempers the previously established schedule consistently produced welds having a coefficient of variation of less than 3 per cent, as shown in Fig. 8. The same schedule, when used on the full-hard grade of stainless steel of the same composition resulted in the production of stronger but less uniform welds. The electrode force was not sufficient to restrain the molten metal from ex-

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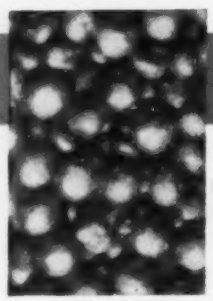

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pulsion and the electrode material used was not sufficiently hard to withstand the hot extrusion pressures potentially present as a result of the sheet hardness variations between the different tempers. The established schedule is therefore suitable for three tempers (annealed, ¼ hard and ½ hard) but is unsuitable for the full hard temper, in spite of the fact that it produces stronger welds on the latter material.

Thickness—It is common practice to increase the magnitudes of the force-time-current variables as material thickness is increased. As a result, the weld strength increases with thickness in a parabolic relationship. When these adjustments are not made, results as depicted by Fig. 9 are obtained. As the material thickness and mass increase above the optimum value for the particular schedule the weld strength approaches zero as no weld nugget is formed. As the thickness decreases below the optimum the strength also rapidly diminishes and the confined zone may become badly overheated locally causing the electrodes to deteriorate rapidly.

Fig. 10 shows the average consistency obtained from a series of schedules, when applied across a thickness range from 0.015 to 0.50-inch.[2] Each point is the coefficient of variation for a five specimen subgroup. Each subgroup was made from a different lot of steel containing less than 0.20 per cent carbon and included sheet, bar and plate stock. For most of the 23 lots of steel, spotwelds were made with a group variation of less than 5 per cent, an indication that welding variables had been properly compensated, on the average, to correct for material thicknesses up to 0.33-inch. Fig. 10 is an example of consistency studies applied to system preselection and control.

Control Chart System—The control chart method of evaluating final production quality consists of plotting a continuous record of the determined values, which are of interest, against time or group number abscissae. For spot weld control the tension-shear strength value is usually the object of interest. In the example shown by Fig. 11, 95 consecutive spot welds were first made and tested to "qualify" the machine, and control. Results of these tests provided the first point "Q" on the charts.

Later, using a different lot of steel, but the identical schedule, 20 consecutive individual test specimens were prepared to demonstrate that the setup and schedule to be used was satisfactory. Average strength

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and consistency of this group of specimens is given by the second point "O" in Fig. 11. Original tests on the 95 specimens averaged 5178 pounds per spot; calculated standard deviation was 71.5 pounds or 1.4 per cent of the obtained average. Second group of 20 specimens averaged 5013 pounds per specimen; the standard deviation was 80.7 pounds or 1.6 per cent.

Both groups of tests were consistent within themselves to 1.6 per cent. The second group average was only 96.8 per cent of the first group, which is the result of variations in steel between the two lots. This magnitude of variation is representative of a reduction from a 50,000 psi strength to a 48,400 psi strength, both steels being within possible specification limits. The variation of spot weld tension-shear strength with variation in steel tensile strength and analyses, has been previously established.[1, 2]

Air Pressure Increased—For purposes of illustration, prior to making the specimens for subgroup 4, the air pressure on the cylinder was deliberately increased 25 per cent to provide a static force of 1250 pounds. Following the general trend of variation, Fig. 2, for the schedule in use, the strengths obtained from this setting were reduced to the extent that the average values were outside the subsequently established control limit, although within the group of three specimens the agreement was good. Had a higher force been applied, even lesser strengths would have been obtained.

Another factor would enter into production consistency under this variation; that is, with the resulting high unit pressures the electrodes would not maintain their shape but would expand in contact areas as the end mushroomed, with a resultant decrease in current density. Had this been an actual production run the use of the control chart would have shown at the end of the one time interval that the results were out of control and the situation could then have been corrected, but an earlier force magnitude check-up would have shown the same thing more quickly.

A deficiency of the control chart method is that it cannot correct for variations occurring between the time intervals at which the control checks are made. When using established welding schedules involving known variations in result with any given variation in conditions, a visual recording or automatic limiter which would indicate departures from schedule or adjust or terminate operations

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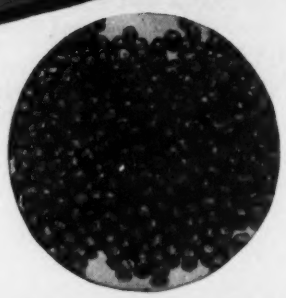

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Main Office and Plant: 880 East 67th Street, Cleveland 8, Ohio
Howell Works—Howell, Michigan

when any particular variable went outside of its known permissible limit, would be superior to the control chart method since it would provide a means for keeping within the required operating limits. For example, when following the pre-established optimum limits for force, strong consistent welds would be made, without further testing, provided a similar check-up was being obtained for the other variables.

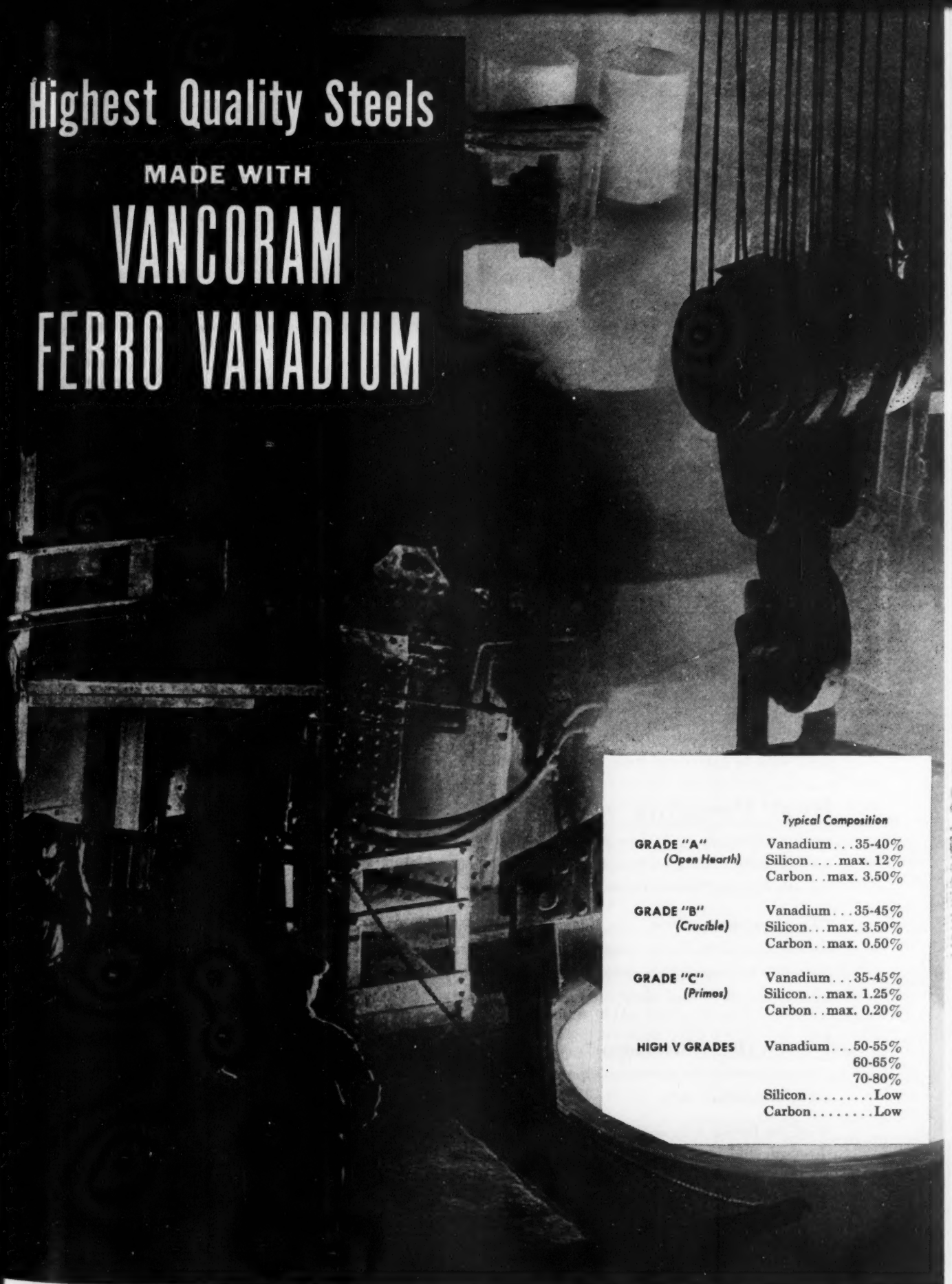
Immediately upon readjustment to the proper force, suitable welds were again produced, and the subgroups 4A, 5 and 6 were acceptable. Just prior to the making of subgroup 7 the welding force was deliberately reduced by 25 per cent to 750 pounds. In accord with the trend of variation for the results obtained, and in the absence of adequate instrumentation, this condition could not be immediately detected by the quality control method. In time, the use of such a low force would probably be detectable from the results produced because the lower force would result in lower unit pressure and higher contact resistance between the electrodes and the work, as shown in Fig. 4 for this particular combination. This in turn results in more serious surface heating and electrode deterioration. After again returning to the initial schedule, subgroups 7A, 8 and 9 provided normal acceptable results.

The time control was next preset off schedule plus 25 per cent to provide 31 cycles for the making of subgroup 10 with the results shown. Considerable scatter within the subgroup of three specimens was obtained and the strengths were out of control on the high side in accord with the trend of variation for time, as shown in Fig. 1. Lowering the time to 19 cycles in subgroup 13 reduced the strength, also in accord with Fig. 1. Results were still within the established control limits for normal operating conditions for times as low as 18 cycles for the single weld specimens.

Whether or not any particular operating schedule can satisfactorily withstand a time reduction as much as 25 per cent is a function of the schedule and the weld spacing. For example, using all other conditions the same, if an 18-cycle time period would have been selected as a normal schedule, a 25 per cent reduction in time would have, on the average, reduced the strength to 2800 pounds which is an unpermissible amount.

REFERENCES

(1) Selecting Spot Welding Schedules for Low Carbon Steels, J. Heuschkel, Oct., 1946, A.W.S. Journal.
(2) Some Metallurgical Aspects of Carbon Steel Spot Welding, J. Heuschkel, Oct., 1947, A.S.M. Journal.
(3) ASA 21.1-1941 Guide for Quality Control.



	Typical Composition
GRADE "A" *(Open Hearth)*	Vanadium . . . 35-40% Silicon . . . . max. 12% Carbon . . max. 3.50%
GRADE "B" *(Crucible)*	Vanadium . . . 35-45% Silicon . . . max. 3.50% Carbon . . max. 0.50%
GRADE "C" *(Primos)*	Vanadium . . . 35-45% Silicon . . . max. 1.25% Carbon . . max. 0.20%
HIGH V GRADES	Vanadium . . . 50-55% 60-65% 70-80% Silicon . . . . . Low Carbon . . . . . Low

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"Thermoil-Granodine" — manganese phosphate coating chemical, applied in an immersion process, forms a dense crystalline coating on iron and steel which, when oiled or painted inhibits corrosion and when oiled protects friction surfaces.

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New Books

Weld Design, by Harry D. Churchill, professor of engineering mechanics, Case Institute of Technology and John B. Austin, welding engineer, Republic Structural Iron Works; cloth, 216 pages, 5¾ x 8½ inches; published by Prentice-Hall Inc., New York, for $6.65; available from STEEL, Penton Building, Cleveland, O.

Today the process of fabricating machine bases by arc welding is being applied to many different types of designs and selection is made on the basis of sound engineering and economy. This book is intended to supply a need for a volume on welded machine-base design and was recommended for publication by the jury of award in the textbook award program of the James F. Lincoln Arc Welding Foundation of Cleveland. The authors treat the subject of design from both practical and theoretical standpoints.

They also felt that the designer should have a thorough understanding of materials that enter into machine base construction and a clear picture of the many methods of processing plates and structural shapes. A considerable portion of the book has been devoted to material of this nature. Other chapters are devoted to stress analysis and design data, welding specifications, procedure and processes and flame cutting and flame hardening. An appendix on stress design data and a bibliography and index complete the book.

Engineers' Dictionary, Spanish-English and English-Spanish, by Louis A. Robb, American Society of Civil Engineers; fabrikoid, 664 pages, 6 x 8½ inches; published by John Wiley & Sons Inc., New York, for $12.50; available from STEEL, Penton Building, Cleveland, O.

Now in its second edition, this dictionary is much more comprehensive than the first edition. Although it is still an engineering publication, frequent references are made to chemistry, geology or metallurgy, but only to the extent that these are regularly needed in connection with engineering work. The same criterion has governed the selection of a few terms of finance, insurance and transportation.

The author states that in enlarging the book, his objective has been to cover the electrical and mechanical engineering field more thoroughly, to bring all branches of civil engineering up to date and to include the important terms peculiar to mining, shipbuilding, logging, sugar milling and oil field operation. A new feature is the notation of gender of

all Spanish nouns. The book should prove valuable to all those engaged in business activities with Central and South American countries.

Machinery's Handbook (14th Edition), by Erik Oberg and F. D. Jones; 1911 pages, 5 x 7 inches; published by Industrial Press, New York, for $7.00; available from STEEL, Penton Bldg., Cleveland, O.

This reference book on machine design and shop practice for the mechanical engineer, draftsman, tool maker and machinist has been expanded to include recent or revised engineering standards together with a large amount of general information and mechanical data representing the latest designing and manufacturing processes. According to the editors, the plan used in selecting materials from the almost limitless supply of data pertaining to mechanical subjects is to consider primarily the needs and requirements in both designing and manufacturing departments of machine building plants.

To attempt to describe the contents of this book to those who are not familiar with it would be difficult but stating that it contains an index of 31 double column pages would give an idea of the extent of content. Data on almost any phase of machine design is included between its covers, whether it be basic mathematical tables, information on fasteners, gearing, motors, screw threads or metal gages, or countless other categories.

How To Run a Lathe (49th edition); 128 pages; published by South Bend Lathe Works, South Bend, Ind., for 25 cents (paper binding) or $1.00 (imitation leather cover); available from STEEL, Penton Bldg., Cleveland, O.

The eleven chapters in this book, which may be used as a reference by experienced machinists or as a text by the apprentice or shop student, cover various types of work including the correct installation and levelling of the lathe, grinding cutter bits, turning, boring, thread cutting, taper turning, drilling, reaming and tapping. It is clearly written in a nontechnical language and is easy for the beginner to understand. It contains more than 350 illustrations.

First edition of the book was copyrighted in 1914 and each succeeding edition has been revised and improved to include suggestions and ideas submitted by practical shop men. New material added in the latest edition includes machinability ratings and cutting speeds for various kinds of steels, standard tolerances for press fits, running fits, push fits and sliding fits, allowance for finish turning, filing, polishing, grinding, reaming, lapping and honing; and tooling dimensions for South Bend lathes.

TOP: General view of the protected area.

CENTER: Foam discharge at the rate of 2 in. per min.

BOTTOM: Area covered by 6 in. of foam blanket in 3 min.

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For many years fire protection engineers have been faced with the problem of finding a feasible answer to the hazard caused by crowded plant facilities where flammable liquids are involved. Conditions of this type exist in many chemical processing industries, metal working plants, petroleum storage and handling and electric power generation properties. A severe hazard was evident at the Schenectady Varnish Company, Schenectady, N. Y., where fire at the tank car loading racks and storage facilities presented a constant threat to the operation of the entire plant.

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LETTERS *to the Editors*

You Certainly May

I was well impressed with your editorial titled "Financial Folly" in the Jan. 16 issue of STEEL magazine on page 21, and would like your permission to reprint this editorial in a suburban monthly newspaper, *Mequon Town Talks*, which has a circulation of about 1400 and is read by about 3500 people. We will be glad to mention that it is a reprint from your magazine. Perhaps we would also like to use the article, "Figures that John Q Can Understand", which appeared on page 30 of the same issue.

A. D. Mayer, Vice President
Wisconsin Bridge & Iron Co.
Milwaukee, Wis.

Permission granted on both.—The Editors

Some Time Ago—

We would appreciate receiving three copies of the article by Mr. M. H. Lebowitz concerning sodium hydride descaling, published in your magazine recently.

P. J. LaMarche
National Distillers Chemical Corp.
New York, N. Y.

The article, "Sodium Hydride Effective in Descaling Stainless Steel Sheets," appeared in the April 5, 1948 issue of STEEL. A copy is being sent.—The Editors

Si, Si, We Oblige

I noticed with a great deal of interest on page 85 of your Nov 7th, 1949, issue that some manufacturer in the U.S.A. is manufacturing a dictating machine that can be used on an automobile battery. I would appreciate it very much if you would advise me the name of the manufacturer of this particular model.

W. P. Hoban, Manager
Latin America Southern Area
Harnischfeger Corp.
Rio de Janeiro, Brazil

SoundScriber Corp., 146 Munson St., New Haven, Conn., makes this type of equipment. Any company making portable equipment of this type probably has a model that could be used in automobiles. An inverter is used to change 6-v dc from the auto battery to 110 v ac. Drag on the battery is said to be about the same caused by an average car radio.—The Editors

Plastic Covered Tubing

We understand that there are now companies making steel tubing with a plastic coating extruded over the outside surface. We would appreciate a list of manufacturers of the above item.

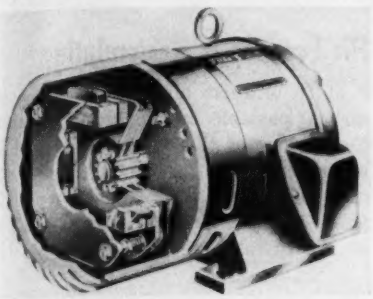
H. L. Logan
Vice President
Niagara Platers Inc.
North Tonawanda, N. Y.

Samuel Moore & Co., Mantua, O., is making such a product. It was covered editorially on page 104 of the July 19, 1948 issue of STEEL.—The Editors

New Products and Equipment

Braking Motor

Braking disks are mounted close to the motor with the shorter shaft to minimize strain and wear on shaft and bearings in the improved brake-motor, made by Star Electric Motor Co., Bloomfield, N. J. Magnets are located away from the motor for maximum heat dissipation and ten-



sion springs are on main brake studs for easy adjustments when required. Brake cover is streamlined and readily removable. Units are for application in various types of start and stop service, including cranes and hoists, high-speed molding presses and machine tools.

Check No. 1 on Reply Card for more Details

Universal Testing Machine

Tensile, compression and transverse tests of a standard nature may be performed on metals, spot welds, rivets, insulating and sheet materials, wire, bricks and plastics by the type LC machine and tools developed by Tinius Olsen Testing Machine Co., Easton Rd., Willow Grove, Pa. Simple in design and operation, the universal machine is compactly constructed.

It is provided with dual capacity ranges of 10,000 and 1000 pounds and is available in both hand operated and motor driven models. Hand operated model is for bench mounting, while the motor powered unit is provided with a stand which houses electrical controls.

Check No. 2 on Reply Card for more Details

Plain Grinding Machine

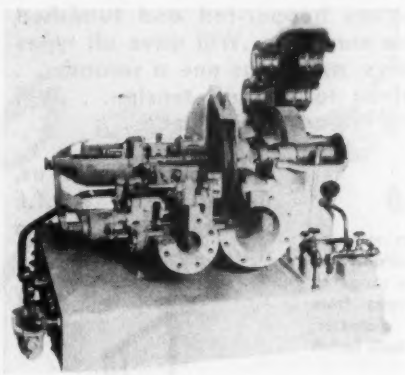
Grinding wheel spindle in Filmatic 14 and 16-inch plain grinding machines, made by Cincinnati Grinders Inc., Cincinnati 9, O., run on Filmatic bearings consisting of multiple segments, fixed axially but free to rock radially. Lubrication of the bearings is automatic and should it fail, the grinding wheel spindle drive motor automatically stops. Machine table is traversed by means of a rack and pinion and a simple drive from the motor and traverse rates are infinitely variable between 3 and 120 inches per minute.

Electrical system provides automatic acceleration and deceleration of the table at reversal. Headstock is a dead spindle direct current motor driven unit with a No. 13 Brown & Sharpe taper hole in the spindle. Spindle speeds are rheostat controlled and infinitely variable from 40 to 144 rpm for the 14-inch machine and 20 to 72 rpm for the 16-inch machine. Thirty extra equipment items are available for the grinding machines.

Check No. 3 on Reply Card for more Details

Steam Turbines for Low Speed

Such equipment as pumps, fans, compressors and generators may be driven at their proper speeds by type E gearturbines built by Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa. Units are built with close-coupled, integral re-



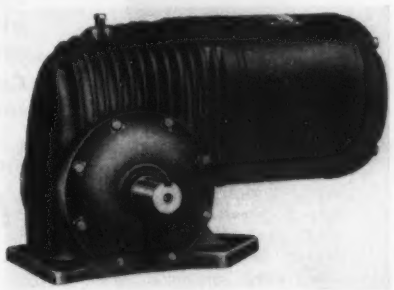
duction gears which enables the turbines to operate at the most efficient speed while driving other equipment. They are available with standard gear reduction ratios and combine a compact speed reduction mechanism coupled to the type E turbine.

Three machined feet form a firm three-point support for the unit. Single helical gears with low helix angle give low thrust against the bearings. Turbine and gear are factory-aligned on a single, heavy plate steel base which also serves as an oil tank.

Check No. 4 on Reply Card for more Details

Gear Motor Line Extended

Addition of a 1½-hp gear motor to a line made by Century Electric Co., 1806 Pine St., St. Louis 3, Mo.,



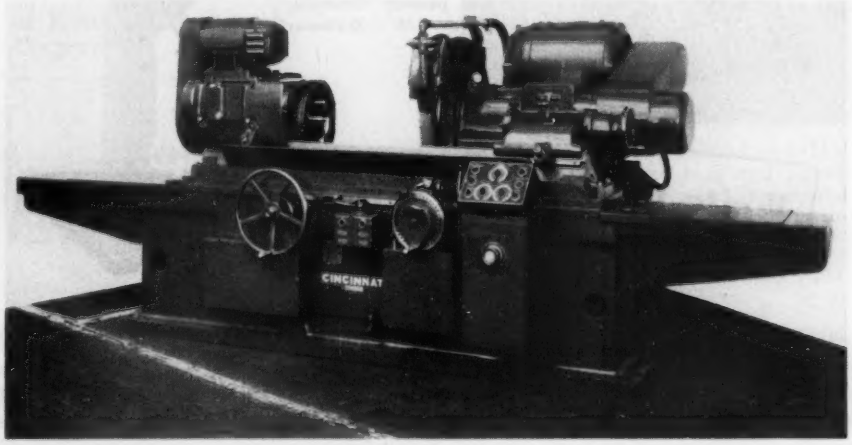
increases the present line from ⅛ to 1½ hp. Larger ratings up to 400 hp are available with gear attachments. All are for operation on single or polyphase alternating or direct current.

Range of speeds that may be obtained with the new unit are from 25 to 280 rpm. Only two moving parts are armature shaft and output shaft. Gears are of the worm type. Two ball and two roller are the only bearings used.

Check No. 5 on Reply Card for more Details

Mercury Temperature Control

Dependable means of measurement and control of temperatures above 1000° F is provided by a 1200° F mercury thermal system for industrial processing, announced by Taylor Instrument Companies, 95 Ames St., Rochester 1, N. Y. Such applications



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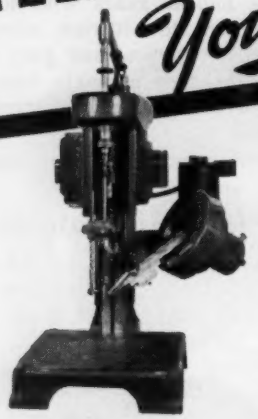

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DETROIT POWER SCREWDRIVER

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Discard the out-of-date, slow hand method of driving screws. . .Do it this speedy, time and labor saving way that will boost your production and bring costs down.

Cash in on its advantages like thousands of other manufacturers are doing . . .Start with the new year. We can make

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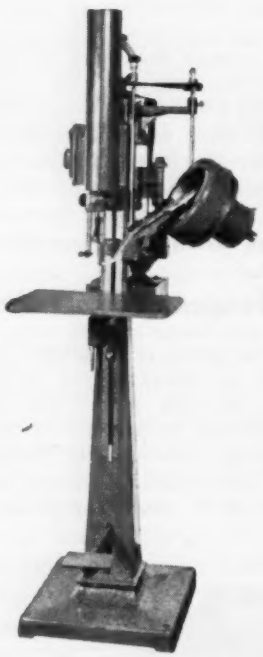
on certain models. Detroit Power Screwdrivers are hopper-fed and furnished in three models. . .Will drive all types of screws, as fast as one a second. . . All driven to uniform tension. . .Will not strip threads or mar heads.

Model A

A sensitive but sturdy machine for driving small screws in delicate assemblies. Capacity, No. 2 to No. 6 screws. Both bench and pedestal types. Designed for maximum service, easy operation and speed.



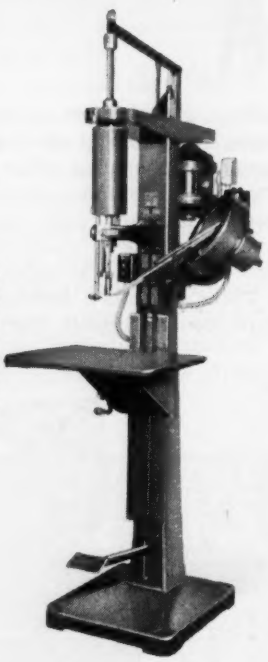
Model B

A real production machine designed for constant service. It drives a range of screws of all types from No. 6 to 1/4" diameter, up to 2" length. Both bench pedestal types.

Model C

A powerful machine for heavy-duty assembly work. Every part husky enough to stand driving hardened cap screws to a tension of 50 foot pounds. Capacity, 1/4" to 5/8" diameter screws.

Come and see us, Booth 939, A.S.T.E Show, Philadelphia April 10-14



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DETROIT POWER SCREWDRIVER CO. **2811 W. FORT ST. DETROIT 16, MICH.**

as gas-fired ovens, annealing ovens, high temperature blanchers, measurement of exhaust gases and others can be served.

Features include a Bourdon type spring, type 347 stainless steel thermal element, compensation for varying case and ambient temperatures and uniformly graduated charts. Range spans of 1000, 600 and 400° F or equivalent Centrigrade are available. No system can be furnished in which the range starts at temperatures below 700° F.

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Pit Furnace Is Recirculating

More uniform circulation of heated air is possible by locating the fan mechanism at the bottom of the heating chamber in the electric recirculating air type pit furnace available from W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn. Intended for

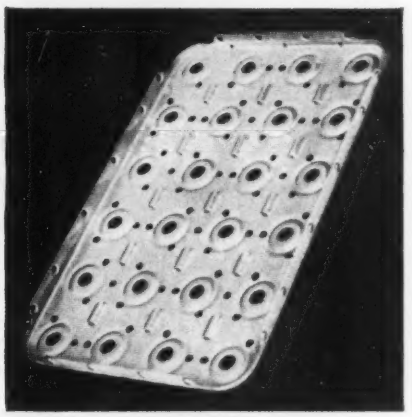
drawing, tempering and normalizing to 1200° F, the furnace is heated by a series of removable Nichrome electric heating coils surrounding the alloy steel basket which rests on an alloy grid plate.

Heating chamber is insulated with a 4½-inch layer of refractory insulating brick, backed up with 3½ inches of block insulation. Fan mounting in the floor is protected by additional insulating packing. Furnace is set on 21¾-inch legs for easy access to the motor drive in the pit. It is offered in capacities of 200, 300, 600 and 1500 pounds of steel per hour.

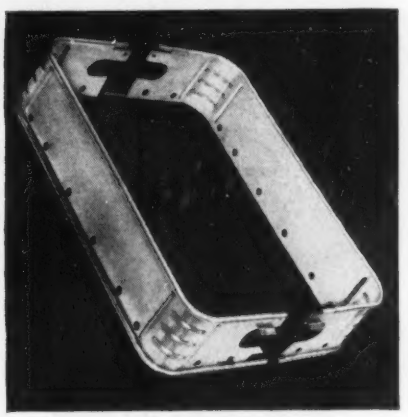
Check No. 7 on Reply Card for more Details

Adjustable Speed Motor Drive

Available in ¾, 1, 1¼ and 2-hp sizes are all-electric variable-voltage type adjustable-speed motor drives, made by Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, O. Designed and built to operate on single-phase alternating current power, the VS drives have



These are the parts of the patented bottle case—produced by modern assembly-line methods: Into a punch press goes a coil of 150S—out comes finished case bottoms.



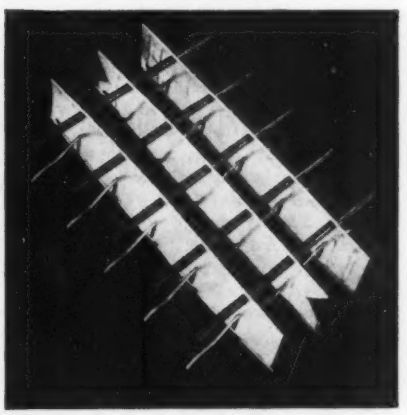
Two spools of coated steel wire and a coil of 150S are simultaneously fed into a rolling machine to form the body in a completely automatic operation.

One every 6 seconds from 150S

Metal Carrier Corporation, Grand Rapids, produces long-lasting, rust-proof aluminum bottle cases like this at the rate of one every six seconds!

By using the new Kaiser Aluminum alloy 150S in place of 52S, they save production steps, slash production costs 4¢ per unit. And they turn out an easily formed case that's strong and durable, that never needs paint, that weighs only 3½ pounds.

You can profit by converting to 150S, too! *It's the world's most versatile aluminum alloy.* Today—call our nearest sales office for more information. Kaiser Aluminum alloy 150S is the exclusive development of Kaiser Aluminum & Chemical Corporation.



Interior bottle divider is formed on a third line of rolling machines and punch presses. Parts are automatically conveyed into the final assembly line, where the interior nest is snapped into the body.

Kaiser Aluminum

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speeds ranging from 290 to 2300 rpm at rated output and as low as 80 rpm for short periods or at light load.

Stepless speed selection and adjustment is provided throughout this operating range. Other functions performed by the unit are quick smooth starting and stopping, jogging and creeping speeds and conveniently centralized control either at the machine or any remote location desired. Design makes it adaptable for application to existing machines or for installation on new units as original equipment.

Check No. 8 on Reply Card for more Details

Light Section Monorail System

Designed for handling of lighter loads or shorter spans is a Trambeam monorail materials handling system, announced by Whiting Corp., Harvey, Ill. Called the T-beam Tram-

beam, it is interconnectable with conventional Trambeam installations and consists of a one-piece rail section, made of high-carbon steel to provide extra strength without adding extra weight.

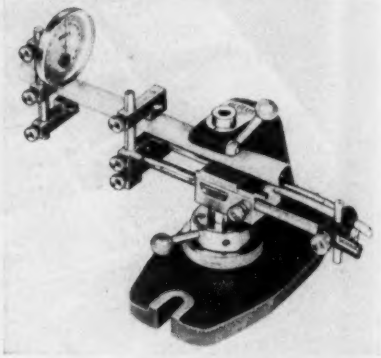
Rail has a flat tread and its hangers, as well as the rail itself, are flexibly suspended to eliminate torsion on the hanger rods, and to equalize wheel loads. System is to be engineered, fabricated and erected for each individual job.

Check No. 9 on Reply Card for more Details

Accurate Drilling Simplified

Drilling of round, flat, square or hexagonal workpieces within an accuracy of 0.0003-inch is simplified with a universal drilling tool, manufactured in Switzerland and distributed in this country by Cosa Corp., 624 Chrysler Bldg., New York 17, N. Y. With accessories, it drills holes at predetermined intervals, adjacent holes for making slots, holes at any radial angle and holes in balls. By automatically centering, it eliminates tracing-out and center punching.

Although primarily a drilling tool, it is an angle comparator in two planes and serves as a depth gage and as a center distance comparator on round, square or hexagonal stock. Called the Reglus, the tool holds



workpieces up to 1¾ inches in diameter and accommodates a series of cylindrical drill bushings having drill holes ranging up to 15/32-inch diameter. Accessories include a V-mount, a cone mount for drilling balls and a modified mount for drilling flat and eccentric pieces.

Check No. 10 on Reply Card for more Details

Gives Uniform Blast Pattern

Light in weight and made of noncorrosive metals, a suction gun designed to replace abrasive pumps used on wet abrasive cleaning cabinets, provides a uniform blast pattern without halo effect, according to Hydrohone Equipment Co., 222 W. Chambers St., Milwaukee, Wis. Conversion kit also contains switch operated solenoid controls for air and water supply.

Also being offered is a new line of wet abrasive cleaning cabinets, including a small model for tool rooms and small machine shops. Features include a new system of ventilation control for better visibility and a new front design for easier operator control.

Check No. 11 on Reply Card for more Details

Programming Test Apparatus

Controlled variations of humidity and temperature may be repeated periodically, according to a predetermined program, by a test apparatus developed by American Instrument Co. Inc., 8030 Georgia Ave., Silver Spring, Md. Standard apparatus provides three humidity-temperature program schedules. Apparatus for other program schedules is available.

It consists of a test chamber, an

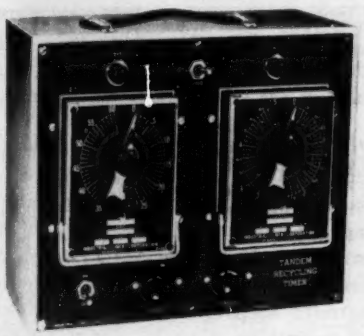
air-conditioning unit and a special control system. Average maximum rate of rise of dew-point temperature (between 60 and 160° F) is plus 0.45° F per minute, without load. Average maximum rate of fall of dew-point temperature (between 60 and 160° F) is minus 0.75° F per minute, without load. Average maximum rates of rise and fall of dry-bulb temperature is equal to or greater in magnitude than for dew-point temperature.

Check No. 12 on Reply Card for more Details

Automatic Timing Device

Two individual timing elements—each able to control a specific operation, are accommodated in the single housing of the tandem recycling timer, manufactured by Industrial Timer Corp., Newark, N. J. When dials are set to the respective time intervals required, each cycle of operation will follow the other continuously in regular sequence.

Complete control cabinet measures 7 x 9 x 11½ inches and contains two



sockets into which the timing elements are plugged so that they control a single pole, double-throw load relay. Toggle switch, load control switch and pilot lamp are integrated with other components in the compact, portable assembly.

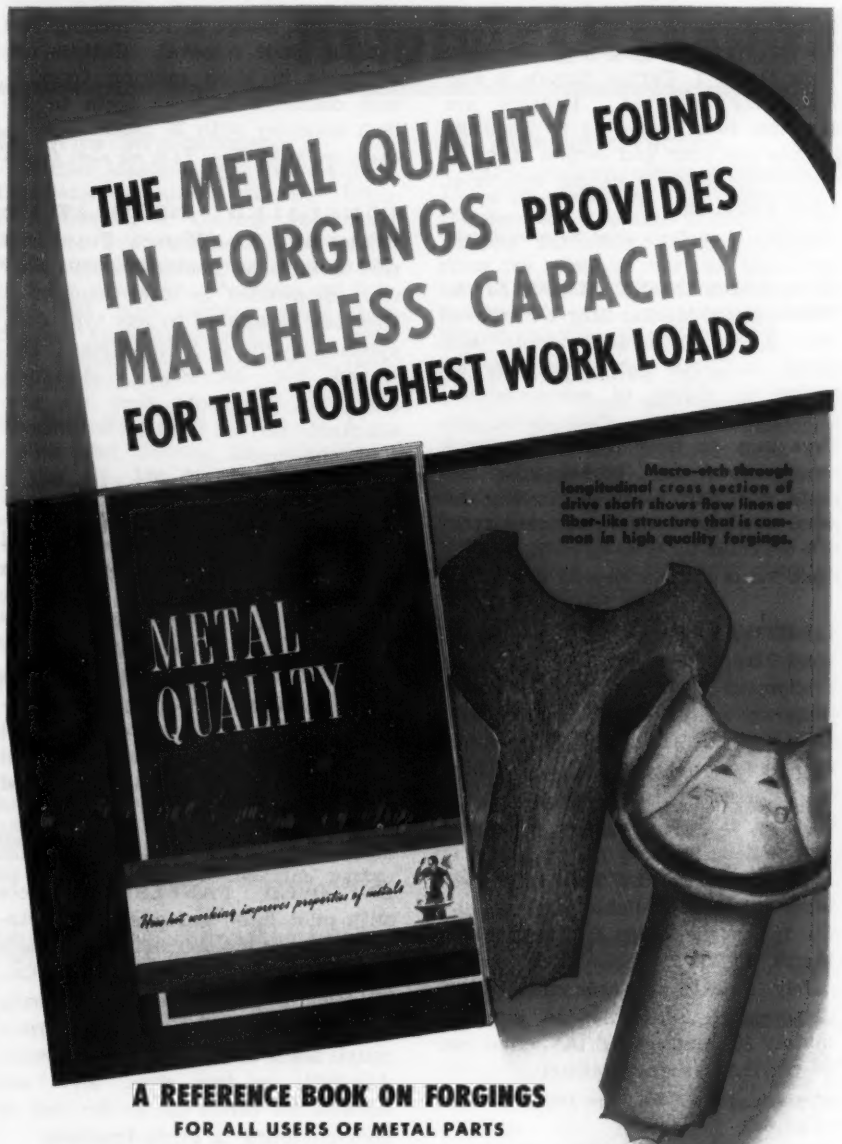
Check No. 13 on Reply Card for more Details

• • •

FLOOR LOCK: A new floor lock for portable elevators, conveyors and floor trucks is announced by Rapids-Standard Co. Inc., Grand Rapids 2, Mich. Three standard models were designed to match Rapistan casters Nos. 3335, 15 and 266 in extended overall height, bolt hole spacing and top plate dimensions.

Check No. 14 on Reply Card for more Details

REDUCES OXYGEN CONTENT: A new deaerating heater to reduce oxygen content of boiler feedwater to less than 0.005-milliliter regardless of rapid load variations or unusual


THE METAL QUALITY FOUND IN FORGINGS PROVIDES MATCHLESS CAPACITY FOR THE TOUGHEST WORK LOADS
METAL QUALITY
How hot working improves properties of metals
Macro-etch through longitudinal cross section of drive shaft shows flow lines or fiber-like structure that is common in high quality forgings.

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Sixty pages of authoritative information on metal quality as developed in forgings formed through the use of closed impression dies. Forging production techniques are described and illustrated; economic advantages of forgings are presented from the viewpoint of top management, design engineers, metallurgists and production executives. Your copy is ready. Fill in and attach coupon below to your business letterhead.

* * *

A product fortified with the metal quality found in forgings outperforms other products. Forgings' grain structure and fiber-like flow lines are controlled, directioned, and concentrated at points where the highest stress and shock occur under actual service conditions. High tensile and impact strength, the reduction of dead weight, and freedom from concealed defects are some of the advantages which are obtainable in forgings.

Now is an excellent time to check your product for cost reductions—explore every possibility to improve performance and appearance, while reducing dead weight of component parts. Double check all parts subject to the greatest stress and strain. Check machining and finishing time schedules—forgings have been known to speed up production by 250 per cent. Rejects at the point of assembly are costly—a needless waste; forgings offer practically a 100 per cent yield of sound parts—and they respond uniformly to heat treatment. Consult a forging engineer—only a forging engineer can inform you fully regarding the many advantages obtainable with forgings.

DROP FORGING ASSOCIATION

605 HANNA BUILDING

CLEVELAND 15, OHIO

Please send 60-page booklet entitled "Metal Quality—How Hot Working Improves Properties of Metal", 1949 Edition.

Name .....

Position .....

Company .....

Address .....

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operating conditions is offered by Graver Water Conditioning Co. New York 11, N. Y. Carbon dioxide is also completely removed. Heaters are available in all sizes up to 2,000,000 pounds per hour and second stage of each unit is tailor-made for individual plant conditions.

Check No. 15 on Reply Card for more Details

FOR PERMANENT IDENTIFICATION: Metal Marker Mfg. Co., Cleveland 3, O., introduces metal tags which facilitate permanent identification or coding of subassemblies, fabricated products, steel stock, etc. Tags may be fabricated from aluminum, brass, steel, Monel, zinc, tinplate, etc. and furnished in any desired quantity in sizes ranging from 6 x 6 inches to ¼ x ¼-inch.

Check No. 16 on Reply Card for more Details

LIGHTWEIGHT TRUCK: No. A-106 hand truck, announced by Sage Equipment Co., Buffalo 13, N. Y., features one-piece all welded steel construction. Trucks can be equipped with solid rubber wheels or 5-inch diameter semipneumatic tires.

Check No. 17 on Reply Card for more Details

LAMP DISPOSAL: The fluorescent lamp disposal, available from Laduby Co. Inc., New Haven 5, Conn., grinds lamps to tiny pieces under water safely, quickly and economically. It disposes of 100 lamps in approximately 10 minutes and the refuse can be carried away in a bucket.

Check No. 18 on Reply Card for more Details

PROTECTS WORKER'S EYES: A new Electro-Lock safety shield is announced by Junkin Safety Appliance Co. Inc., Louisville, Ky. As a safety shield it will permit operator to clearly see his work and at the same time protect his eyes and face from sparks, flying chips and emery dust. As a machine control it will not permit the grinder to be started unless the shield is in a completely protective position.

Check No. 19 on Reply Card for more Details

ABRASION RESISTANT TUBING: Chicago Metal Hose Corp., Maywood, Ill., introduces abrasion resistant flexible tubing for conveying granular materials. Fabricated from galvanized steel strip it is of the fully interlocked type.

Check No. 20 on Reply Card for more Details

CUTTER FOR CAST IRON: Super Tool Co., Detroit 13, Mich., has developed a solid carbide insert blade cutter head for cast iron. Locking wedge is placed below the blade and actuated by a set screw which moves the wedge in for locking and out for blade removal. Cutters are available in sizes ranging from 6-inch diameter with 12 teeth to 14-inch diameter with 28 teeth.

Check No. 21 on Reply Card for more Details

CONCEALED INSTALLATION: Reznor Mfg. Co., Mercer, Pa., offers new automatic, gas-fired duct heaters. Suspended or base supported, they can be applied to any type duct system, singly or in multiples. Designed for concealed installation along hot air routs, they are also adaptable for use with air conditioning units.

Check No. 22 on Reply Card for more Details

CONVEYS FLUIDS: All-Flex ball bearing swivel pipe coupling, made by Gil-Lair Products Inc., Pasadena, Calif., is designed to handle the conveying of fluids under high pressure through a pipe that swivels or rotates a full 360 degrees in all planes. Rotating members of coupling are held tightly together with two sets of ball bearings operating in flame-hardened and ground ball races.

Check No. 23 on Reply Card for more Details

ENCLOSED PANELS: Complete with pilot light and pushbutton station, the enclosed instrument panels offered by Claud S. Gordon Co., Chicago 16, Ill., are wired and ready for connecting power and thermocouple leads to terminals in the panel. Available in two sizes, units are suitable for bench use or for wall or floor-mounting in angle brackets.

Check No. 24 on Reply Card for more Details

CHAIN BREAKING VISE: The steel jaw chain vise, made by Morse Chain Co., Detroit 8, Mich., accommodates all American standard sizes of roller chain from ½ to 2½-inch pitch, single and multiple widths. Changes for accommodation of different sizes may be made instantly and settings are accurately maintained until readjusted.

Check No. 25 on Reply Card for more Details

PRECISION PARALLELS: Rahn Granite Surface Plate Co., Dayton 7, O., announces precision parallels made of black granite (diabase) to a claimed overall tolerance of 0.00005-inch in a set, in sizes from ½ x 1 x 6 inches to 1 x 2 x 12 inches. Larger sizes can be made up to 4 x 6 x 30 inches.

Check No. 26 on Reply Card for more Details

COOLANT BASE: Safco 770 compound, developed by Swan-Finch Oil Corp., New York 20, N. Y., is a milky white fluid that dissolves in either warm or cool water and is recommended for both grinding and machining operations. In grinding operations it prevents wheel loading, reduces wheel dressing and keeps work from rusting. In machining operations it provides positive lubrication, produces fine surface finish and prevents rust.

Check No. 27 on Reply Card for more Details

FILES BLUEPRINTS: Draw-In-Dex cabinet, made by Empire Development Corp., New York 4, N. Y., may be used for filing blueprints safely and conveniently. It accommodates 1000 prints and any one can be removed without disturbing the others. An index file locates prints immediately.

Check No. 28 on Reply Card for more Details

AIR-CLAMPING CYLINDERS: Push type, spring return cylinders, made to provide maximum power in a minimum of space, are offered by A. Schrader's Son Division, Brooklyn 17, N. Y. They have 1 and 2-inch stroke lengths and bore sizes of 1, 2½ and 3 inches. For use with the cylinders, a bantam size three way valve was also developed.

Check No. 29 on Reply Card for more Details

PLUG-IN FURNACE: Designated as Handy-Melt, a self-contained, compact, plug-in electric furnace weighing 6¾ pounds, with a temperature range up to 2000° F, is offered by Jelrus Co. Inc., New York, N. Y. It permits melting of small quantities of metals in 6 to 12 minutes. Pyrometer, mounted on insulated handle, indicates metal temperatures.

Check No. 30 on Reply Card for more Details

MINIMUM CONTAMINATION: To prevent contamination of the indicating liquid, drain and cleanout plugs are straight threaded and gasket sealed on the new line of reservoir type manometers announced by King Engineering Corp., Ann Arbor, Mich. Easy cleanout is provided by a plugged opening in the rear. Instruments are available in 14 lengths with scales from 12 to 116 inches long for use on line pressures up to 200 psi.

Check No. 31 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Helpful Literature

72. Floating Disk Clutch

Carlyle Johnson Machine Co.—Expanded 1950 edition of Maxitorq floating disk clutch catalog presents engineering drawings, cutaway illustrations and specifications for eight standard size units rated from ¼ to 15 hp at 100 rpm in single and double types, wet or dry. New section shows three types of driving cups: pulley type, cut-off coupling and ring type.

73. Magnetic Starter

Arrow-Hart & Hegeman Electric Co.—4-page illustrated catalog depicts advantages and features of type RA magnetic starters for 5-hp 220-v and 7½ hp 440-v or 550-v motors. Wiring diagrams and engineering data are included also.

74. Rust Preventives

Dearborn Chemical Co.—Catalog on No-Ox-Id rust preventives presents information on five general classifications: oil, grease or wax, solvent cutback, drying and miscellaneous consistencies. Information is included on each consistency covering characteristics, coverage, and method of application.

75. Fluid Pressure Cell

Baldwin Locomotive Works—Illustrated leaflet No. 306 describes and gives complete specifications for SR-4 resistance wire strain gage type pressure cells available in eight capacities from 200 to 50,000 psi.

76. Bridge-Stop Control

Electric Controller & Mfg. Co.—4-page illustrated bulletin No. 921-6.0 describes Dynamic Braking bridge-stop safety control for quick stopping of bridge motions of standard cranes, transfer and larry cars.

77. Pipe Tools

Beaver Pipe Tools, Inc.—Illustrated catalog No. 50 presents up-to-date information on line of pipe tools, machines, power drives and threading oil. Included are sections showing acceptance of these products by various industrial users.

78. Carbon Splash Plates

National Carbon Co. — Illustrated catalog section M-8704 shows use of carbon in construction of splash plates for blast furnace. Two methods of applying standard carbon shapes are detailed.

79. Cutting Lubricant

Macco Products Co.—Two illustrated folders on Macco 472 depicts uses of this heavy-duty water-soluble cutting lubricant which is applicable with all kinds of cutting machine tools and all types of metal. It has high film strength, wets out thoroughly and acts as rust inhibitor.

80. Wire Straighteners

Mettler Machine Tool, Inc.—4-page illustrated circular "Shuster Wire Straightening & Cutting Machines" describes five models of these units with capacities ranging from 0.025 to ⅝-in. diameter. Features are fast feed and high cutting speed that delivers undistorted square-cut ends. Two models are equipped with variable speed drives.

81. Ball Bearings

Nice Ball Bearing Co.—Illustrated catalog No. 140 depicts line of ball bearings including radial, thrust and combined radial-thrust ranging from close tolerance precision units to inexpensive pressed steel bearings of unground type. Listings also cover ball bearing sheaves, rollers, wheels and casters.

82. Free-Machining Bar Steel

La Salle Steel Co.—4-page illustrated folder "La Led . . . A New Free-Machining Bar Steel" points out features and applications of cold-finished open-hearth steel to which lead has been added. This fast-machining material is especially suitable for automatic screw machine parts.

83. Automatic Tackers

Fastener Corp.—24-page illustrated Duo-Fast "Catalog and Profitable Suggestions" contains descriptions of various automatic tackers, suggestions for some of various jobs that can be speeded up with this type of equipment, and numerous photographs of applications.

84. Self-Adhesive Tape

Topflight Tape Co.—4-page illustrated promotion piece describes Kenslo cloth sew-in labels that are distinguished by raised lettering; Print-Stix self-adhesive stickers used for point-of-purchase displays; and Topflex self-adhesive tape that resists moisture, temperature changes and abrasive action.

85. Fabricating Machines

Cleveland Punch & Shear Works Co. — 12-page illustrated booklet "Cleveland Fabricating Tools" presents data on vertical open gap machines; horizontal and multiple punches; angle, bar and gate shears; bending and straightening rolls and machines; plate flanging clamps; plate and rotary planers; wall radial drills; and other machines.

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9	29	49	69	89
10	30	50	70	90
11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
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HELPFUL LITERATURE

86. Bolting Cloth

Buffalo Wire Works Co.—2-page illustrated form No. 590 presents data on stainless steel bolting cloth for fast uniform screening of light or powdery substances.

87. Cylindrical Electrodes

International Graphite & Electrode Corp.—2-page illustrated data sheet on threaded cylindrical electrodes presents corrected dimensions of electrode nipples. Listed are dimensions for tapered, straight and U. S. Standard threads.

88. Stainless Steel

Allegheny Ludlum Steel Corp.—30-page illustrated brochure "Allegheny Metal in the Meat Industry" presents comprehensive discussion of use of stainless steel in meat packing and processing and presents data on technology, corrosion resistance, forms and fabrication of Allegheny stainless steel.

89. Sleeve Bearings

Johnson Bronze Co.—Four illustrated data sheets discuss selection of stock sizes or special sleeve bearings, graphited bronze bearings and standard tests for sleeve bearings. Included with set is 8½ x 11-in. wall chart on decimal equivalents.

90. Business Accounting

International Business Machines Corp.—12-page illustrated form No. 52-5722-0 tells how IBM service bureaus handle regular monthly accounting procedures, peak loads or special reports quickly and accurately. Payroll and cost records, sales records, questionnaire analysis and inventory accounting are among services offered.

91. Gears

Fairfield Mfg. Co.—16-page illustrated brochure depicts company's facilities for engineering, producing, heat treating and testing wide range of industrial gears including hypoid, helical, worm, herringbone, spur, Zerol, spiral bevel and straight bevel types. Also listed are differentials and splined shafts for various types of service.

92. Furnace Control Equipment

Leeds & Northrup Co.—4-page illustrated folder ND-600(1) explains how temperature, pressure and air-fuel ratio can be maintained at high level of efficiency by use of packaged integrated control equipment. Equipment is designed for furnaces including soaking pit, open-hearth, large annealing, car bottom, cover and lime kiln types.

93. Magnetic Controls

Whiting Corp.—4-page illustrated bulletin No. 72 discusses applications of magnetic crane controls that employ small master switches and solenoid starters. System is designed to be used with company's Full-Vision cab.

94. Investment Casting

Microcast Div., Austenal Laboratories, Inc.—16-page illustrated manual "New Horizons With Microcasting" discusses precision investment casting technique for casting of high-fusing alloys difficult or impossible to forge or machine. Typical parts produced, design factors and industrial advantages are covered.

95. Surface Roughness Gage

Physicists Research Co.—4-page illustrated publication "Practical Operating Features of the Profilometer" explains advantages of Profilometer gage for shop measurement of surface roughness. Illustrations show range of work measured including small holes, internal grooves, deep bores and circular surfaces.

96. Soot Blowing Systems

Vulcan Soot Blower Corp.—16-page illustrated bulletin No. 483 describes automatic-sequential power-operated soot blowing systems. One central panel controls and indicates operation of each blowing unit and permits independent control of any unit by pushbutton.

97. Welding Electrode

Eutectic Welding Alloys Corp.—2-page illustrated form EU 1 contains data on Steel-Tectic electrode with low-melting-point self-cleaning flux which welds over previous deposit without removal of slag and is equally efficient with low or high amperage.

98. Industrial Gloves

B. F. Goodrich Co.—4-page illustrated catalog section 9035 is descriptive of acid-resisting and oil-resisting types of industrial gloves. Heavy and light gage gloves with smooth or rough surface are depicted and their specifications and uses outlined.

99. Spring Tension Washers

M. D. Hubbard Spring Co.—8-page illustrated bulletin SPW-9 discusses uses and gives dimensions of bowed, wave, slotted and cupped washers. Also described are special washers and cotter pins, hair pin cotters, expansion plugs and spring door catches.

100. Heavy-Duty Scalper

Hewitt-Robins, Inc., Robins Conveyors Div.—4-page illustrated bulletin No. 131 describes heavy-duty scalper vibrating machine that is able to scalp-off lumps of solid rock as large as 5 x 5 x 5 ft and weighing 1½ tons or more per piece.

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11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
15	35	55	75	95
16	36	56	76	96
17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
20	40	60	80	100

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Market Summary

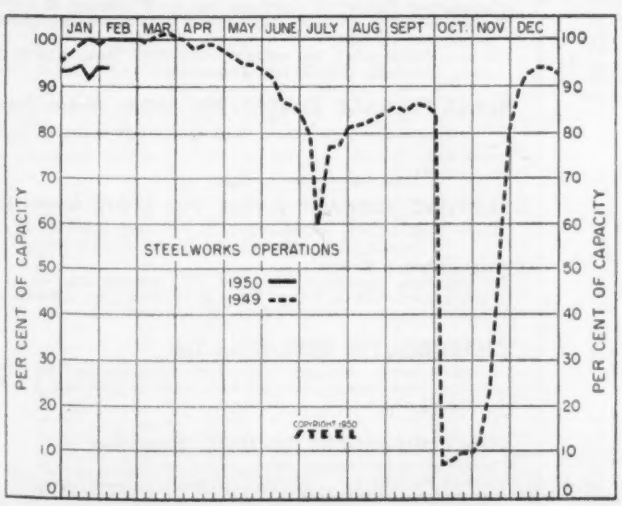
PROTECTIVE ordering of steel is gaining. Threatened steel curtailments due to coal shortage are stimulating consumer interest in forward coverage. Anticipatory buying has not assumed major proportions but it promises to become pronounced unless the coal outlook improves quickly. Steel inventories have not yet attained pre-steel strike levels. Manufacturers fear being caught with short supplies should steelmaking be sharply curtailed. Metalworking operations would be more quickly depressed by a cutback in steel shipments today than was the case last October when the steelworkers went on strike.

COAL—Immediate future steel production policy rests on pending developments in the coal labor controversy. Pressure for court action under the Taft-Hartley Act and the President's suggestion for full-scale mining pending findings of a proposed fact-finding board emphasize the seriousness of the coal situation. Coal stocks at most steel mills are adequate to support operations at high level for several weeks. But some important producers have short supplies and may be forced to cut production within a week or so unless the outlook improves. Several blast furnaces already have been banked. Wind has been reduced on some. Ingot operations have been only slightly affected so far, however, declines at certain producing points being offset by increases at others.

DEMAND—No letup in demand for the light, flat-rolled products is expected before mid-second quarter at earliest. If anything, pressure for shipments currently is being stepped up and producers could book tonnage into third quarter if they were so disposed. Other products are in somewhat stronger demand but, except for wire and pipe, demand-supply conditions are not comparable with those in sheets and strip. Producers are heavily booked through June on tin plate. Carbon bar deliveries range up to 6 weeks in most sizes. Cold-drawn and alloy bar shipments can be had in 5 weeks. Plates are fairly active in Midwest but slow in the East. Seasonal dullness prevails in structurals but substantial spring pickup is in the making. Mill order books are loaded with wire product tonnage for two or three months, reflecting, partly, expanding farm requirements.

CONVERSION—Buying of conversion steel by automotive and household appliance makers is noted. Demand is not spirited, however. Conversion ingot is reported selling at $75 to $80 per ton compared with $50 in the regular market. It is difficult to pin down prices in this market area. Some conversion sheet tonnage for April has been placed and several May deals are reported in the fire. A few market authorities think demand for conversion steel will fade in second quarter. This view is held despite the fact certain metalworking operations still are restricted by short and unbalanced steel inventories. Nevertheless, they fear manufacturing industry may have set its production sights too high for this year and that an inventory liquidation drive may get going before too long.

PRICES—The steel market now is well established at the higher levels. Isolated revisions continue as individual producers bring their quotations into line with the general market or effect corrective adjustments in both base prices and extras. STEEL's weighted index on finished steel is unchanged at 156.13. The arithmetical index on finished steel also is steady at $93. Pig iron composites are unchanged as follows: No. 2 foundry, $46.22; basic, $45.72; malleable, $47.27. Steelmaking scrap prices turned upward for the first time since mid-November, the price composite on steelmaking grades rising to $27.33 from $26.83 the week preceding. A year ago this index stood at $39.42.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Feb. 4	Change	Same Week 1949	Same Week 1948
Pittsburgh	94.5	+ 1*	97	90
Chicago	97.5	— 0.5*	99.5	92.5
Eastern Pa.	84	— 2	97	91
Youngstown	97	— 3	105	102
Wheeling	97.5	+ 1.5	95	90
Cleveland	96	+ 1*	102	94.5
Buffalo	101.5	+ 6	104	83.5
Birmingham	100	None	100	100
New England	78	— 2	87	80
Cincinnati	101	— 2	105	87
St. Louis	89	+ 2	84.5	78
Detroit	107	+ 1	102	92
Western	90	+ 1	..	..
Estimated national rate	94	None	100	94

Based on weekly steelmaking capacity of 1,906,267 net tons for 1950; 1,843,516 net tons for 1949; 1,802,476 net tons for 1948.
*Change from revised rate.

News Summary—p. 51 Production-Engineering News—p. 81

MARKETS SUMMARY
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Composite Market Averages

	Feb. 2 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	156.13	156.13	156.13	155.05	100.65
Index in cents per lb ...	4.230	4.230	4.230	4.200	2.727
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$93.00	$93.00	$92.72	$97.77	$64.45
No. 2 Fdry Pig Iron, GT	46.22	46.22	46.10	46.63	23.67
Basic Pig Iron, GT.....	45.72	45.72	45.60	46.22	23.00
Malleable Pig Iron, GT..	47.27	47.27	47.27	47.34	24.29
Steelmaking Scrap, GT..	27.33	26.83	26.83	39.42	19.17

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39; Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Feb. 2 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh....	3.45	3.45	3.45	3.35–55	2.15
Bars, H.R., Chicago.....	3.45	3.45	3.45	3.35	2.15
Bars, C.F., Pittsburgh	4.10-4.15	4.10-4.15	4.10-4.15	3.95-4.25	2.65
Shapes, Std., Pittsburgh..	3.40	3.40	3.40	3.25–30	2.10
Shapes, Std., Chicago.....	3.40	3.40	3.40	3.25	2.10
Plates, Pittsburgh	3.50	3.50	3.50	3.40–60	2.20
Plates, Chicago	3.50	3.50	3.50	3.40	2.20
Plates, Coatesville, Pa. ...	3.60	3.60	3.60	3.75	2.20
Plates, Sparrows Point, Md.	3.50	3.50	3.50	3.45	2.20
Plates, Claymont, Del. ...	3.60	3.60	3.60	3.95	2.20
Sheets, H.R., Pittsburgh..	3.35	3.35	3.35	3.25–30	2.20
Sheets, H.R., Chicago.....	3.35	3.35	3.35	3.25	2.20
Sheets, C.R., Pittsburgh ..	4.10	4.10	4.10	4.00	3.05
Sheets, C.R., Chicago	4.10	4.10	4.10	4.00	3.05
Sheets, C.R., Detroit	4.30	4.30	4.30	4.20	3.15
Sheets, Galv., Pittsburgh..	4.40	4.40	4.40	4.40	3.65
Strip, H.R., Pittsburgh ...	3.25	3.25	3.25	3.25–70	2.10
Strip, H.R., Chicago	3.25	3.25	3.25	3.25–30	2.10
Strip, C.R., Pittsburgh ...	4.15	4.15	4.15	4.00–75	2.80
Strip, C.R., Chicago	4.30	4.30	4.30	4.00–25	2.90
Strip, C.R., Detroit	4.35-4.40	4.35-4.40	4.35-4.40	4.20–50	2.90
Wire, Basic, Pittsburgh ...	4.50	4.50	4.50	4.15–4.50	2.60
Nails, Wire, Pittsburgh ...	5.30	5.30	5.30	5.15–6.30	2.80
Tin plate, box, Pittsburgh.	$7.50	$7.50	$7.50	$6.70	$5.00

SEMIFINISHED

Billets, forging, Pitts.(NT)	$63.00	$63.00	$63.00	$61.00	$40.00
Sheet bar, mill (NT)	57.00–58.00	57.00–58.00	51.78–57.00	67.00	34.00
Wire rods, 7/32-⅝", Pitts. .	3.85	3.85	3.85	3.40–4.15	2.00

PIG IRON, Gross Ton

Bessemer, Pitts.	$47.00	$47.00	$47.00	$47.00	$24.50
Basic, Valley	46.00	46.00	46.00	46.00	23.50
Basic, del. Phila.	49.44	49.44	49.44	50.30	25.34
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, Chicago	46.50	46.50	46.50	46.00-46.50	24.00
No. 2 Fdry, Valley	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, del. Phila. ...	49.94	49.94	49.94	50.80	25.84
No. 2 Fdry, Birm. ...39.38-42.38		39.38-42.38	39.38	43.38	20.38
No. 2 Fdry.(Birm.)del Cin.	46.08	46.08	46.08	49.43	24.06
Malleable, Valley	46.50	46.50	46.50	46.50	24.00
Malleable, Chicago	46.50	46.50	46.50	46.50	24.00
Charcoal, Lyles, Tenn. ...	60.00	60.00	60.00	66.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	140.33*

* Delivered, Pittsburgh.

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts. ..$31.25		$30.00	$30.00	$41.00	$20.00
No. 1 Heavy Melt. E. Pa..	23.25	23.00	23.50	40.25	18.75
No. 1 Heavy Melt. Chicago	27.50	27.50	27.00	39.00	18.75
No. 1 Heavy Melt. Valley..	31.25	30.25	30.25	37.75	20.00
No. 1 Heavy Melt. Cleve..	28.25	27.25	27.25	37.25	19.50
No. 1 Heavy Melt. Buffalo	27.75	27.75	27.75	42.50	19.25
Rails, Rerolling, Chicago..	39.50	39.50	39.50	51.00	22.25
No. 1 Cast, Chicago.....	40.50	40.50	38.50	47.50	20.00

COKE, Net Ton

Beehive, Furn., Connlsvl. ..$13.25		$13.25	$13.25	$14.50	$7.00
Beehive, Fdry., Connlsvl. ..	15.50	15.50	15.50	17.00	7.75
Oven Fdry., Chicago	21.00	20.00	20.00	20.40	13.35

NONFERROUS METALS

Copper, del. Conn.	18.50	18.50	18.50	23.50	12.00
Zinc, E. St. Louis	9.75	9.75	9.75–10.00	17.50	8.25
Lead, St. Louis	11.80	11.80	11.80	21.30–35	6.35
Tin, New York	74.25	75.00	77.50	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex. ..	27.25	28.75	32.00	38.50	14.50
Nickel, refinery, duty paid.	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$48.00	$48.50	$49.00	$49.50
Newark,del	50.63	51.13	51.63	52.13
Brooklyn,N.Y.,del.	....	52.79	53.29	....
Birmingham District				
Birmingham R2	41.88	42.38	....	....
Birmingham S9	38.88	39.38	....	....
Woodward,Ala. W15	38.88	39.38	....	....
Cincinnati,del.	....	46.08	....	....
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	....
Tonawada,N.Y. W12	46.00	46.50	47.00	....
N.Tonawanda,N.Y. T9	....	46.50	47.00	....
Boston,del.	55.26	55.76	56.20	....
Rochester,N.Y.,del.	48.63	49.13	49.63	....
Syracuse,N.Y.,del.	49.58	50.08	50.58	....
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.00
Gary,Ind. C3	46.00	....	46.50	....
IndianaHarbor,Ind. I-2	46.00	....	46.50	....
So.Chicago,Ill. W14, Y1	46.00	46.50	46.50	....
So.Chicago,Ill. C3	46.00	....	46.50	47.00
Milwaukee,del.	47.89	48.39	48.39	48.89
Muskegon,Mich.,del.	....	51.98	51.98	....
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.00
Cleveland R2	46.00	46.50	46.50	....
Akron,del. from Cleve.	48.39	48.89	48.89	49.39
Lorain,O. N3	46.00	....	....	47.00
Duluth I-3	....	....	46.50	....
Erie,Pa. I-3	46.00	46.50	46.50	47.00
Everett,Mass. E1	....	50.50	51.00	....
Fontana,Calif. K1	52.00	52.50	....	....
Geneva,Utah G1	46.00	46.50	....	....
Seattle,Tacoma,Wash.,del.	....	54.20	....	....
Portland,Oreg.,del.	....	54.20	....	....
LosAngeles,SanFrancisco,del	53.70	54.20	....	....
GraniteCity,Ill. M10	47.90	48.40	48.90	....
St.Louis,del.(incl. tax)	48.65	49.15	49.65	....
Ironton,Utah C11	46.00	46.50	....	....
Minnequa,Colo. C10	47.00	47.50	47.50	....
Pittsburgh District				
NevilleIsland,Pa. P6	46.00	46.50	46.50	47.00
Pitts,N.&S. sides, Aliquippa,del.	47.19	47.69	47.69	48.19
McKeesRocks,del.	46.95	47.45	47.45	47.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	47.44	47.94	47.94	48.44
Verona,del.	47.90	48.40	48.40	48.90
Brackenridge,del.	48.13	48.63	48.63	49.13
Bessemer,Pa. C3	46.00	....	46.50	47.00
Clairton,Rankin,So.Duquesne,Pa. C3	46.00	....	....	....
McKeesport,Pa. N3	46.00	....	....	47.00
Sharpsville,Pa. S6	46.00	46.50	46.50	47.00
Steelton,Pa. B2	48.00	48.50	49.00	49.50
Steubenville,O. W10	46.00	....	....	....
Struthers,O. S16	46.00	....	....	....
Swedeland,Pa. A3	48.00	48.50	49.00	49.50
Philadelphia,del	49.44	49.94	50.44	50.94
Toledo,O. I-3	46.00	46.50	46.50	47.00
Cincinnati,del.	51.01	51.51	....	....
Troy,N.Y. R2	48.00	48.50	49.00	....
Youngstown District				
Hubbard,O. Y1	46.00	46.50	46.50	....
Youngstown C3	46.00	....	....	47.00
Youngstown Y1	46.00	46.50	46.50	47.00
Mansfield,O.,del.	50.26	50.76	50.76	51.26

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; Add $1 for each 0.5% Si to 11.50%)

Jackson,O. J1, G2	$57.00
Buffalo H1	58.25

ELECTRIC FURNACE SIVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls,N.Y. P15	$71.50
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2	77.00
Keokuk,Iowa, OH & Fdry., 12½ lb. piglets, frt. allowed K2.	82.00
Wenatchee,Wash., OH & Fdry, frt. allowed K2	77.00

CHARCOAL PIG IRON, Gross Ton

(Low phos. semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$80.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, Intermediate, A7	$51.00
Steelton,Pa. B2	54.00
Philadelphia delivered	57.00
Troy,N.Y. R2	54.00

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Semifinished and Finished Steel Products

Mill prices as reported to STEEL, Feb. 2, 1950; cents per pound unless otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)

Detroit R7 ..... $50.00
Munhall,Pa. C3 ..... 50.00

INGOTS, Alloy (NT)

Detroit R7 ..... $51.00
Houston,Tex. S5 ..... 59.00
Midland,Pa. C18 ..... 51.00
Munhall,Pa. C3 ..... 51.00
So.Duquesne,Pa. C3 ... 51.00

BILLETS, BLOOMS & Slabs Carbon, Rerolling (NT)

Bessemer,Pa. C3 .... $53.00
Clairton,Pa. C3 ..... 53.00
Conshohocken,Pa. A3 .. 58.00
Ensley,Ala. T2 ..... 53.00
Fairfield,Ala. T2 ..... 53.00
Fontana,Cal. K1 ..... 72.00
Gary,Ind. C3 ..... 53.00
Johnstown,Pa. B2 .... 53.00
Lackawanna,N.Y. B2 .. 53.00
Munhall,Pa. C3 ..... 53.00
Sharon,Pa. S3 ..... 57.00
So.Chicago,Ill. C3 .... 53.00
So.Duquesne,Pa. C3 .. 53.00

Carbon, Forging (NT)

Bessemer,Pa. C3 .... $63.00
Buffalo R2 ..... 63.00
Canton,O. R2 ..... 63.00
Clairton,Pa. C3 ..... 63.00
Cleveland R2 ..... 63.00
Conshohocken,Pa. A3.. 65.00
Detroit R7 ..... 63.00
Ensley,Ala. T2 ..... 63.00
Fairfield,Ala. T2 ..... 63.00
Fontana,Calif. K1 .... 82.00
Gary,Ind. C3 ..... 63.00
Geneva,Utah G1 ..... 63.00
Houston,Tex. S5 ..... 71.00
Ind.Harbor, Ind. I-2 .. 63.00
Johnstown,Pa. B2 .... 63.00
Lackawanna,N.Y. B2 .. 63.00
LosAngeles B3 ..... 82.00
Munhall,Pa. C3 ..... 63.00
Seattle B3 ..... 82.00
So.Chicago C3, R2, W14 .63.00
So.Duquesne,Pa. C3 .. 63.00
So.SanFrancisco B3 .. 82.00
Warren,O. C17 ..... 63.00
Warren,O. C17 ..... 63.00

Alloy (NT)

Bethlehem,Pa. B2 .... $66.00
Buffalo R2 ..... 66.00
Canton,O. R2, T7 .... 66.00
Conshohocken,Pa. A3 .. 68.00
Detroit R7 ..... 66.00
Fontana,Calif. K1 .... 82.00
Gary,Ind. C3 ..... 66.00
Houston,Tex. S5 ..... 74.00
Ind.Harbor,Ind. Y1 ... 66.00
Johnstown,Pa. B2 .... 66.00
Lackawanna,N.Y. B2.. 66.00
LosAngeles B3 ..... 88.00
Massillon,O. R2 ..... 66.00
Midland,Pa. C18 ..... 66.00
Munhall,Pa. C3 ..... 66.00
Sharon,Pa. S3 ..... 66.00
So.Chicago C3, R2, W14 .66.00
So.Duquesne,Pa. C3 .. 66.00
Warren,O. C17 ..... 66.00
Youngstown Y1 ..... 66.00

SHEET BARS (NT)

Mansfield,O. E6 ..... $58.00
Sharon,Pa. S3 ..... 57.00

ROUNDS, SEAMLESS TUBE (NT)

Canton,O. R2 ..... $76.00
Cleveland R2 ..... 76.00
Ind.Harbor,Ind. I-2 .... 76.00
Massillon,O. R2 ..... 76.00
So.Chicago,Ill. R2 .... 76.00

SKELP

Aliquippa,Pa. J5 ..... 3.15
Munhall,Pa. C3 ..... 3.15
Warren,O. R2 ..... 3.15
Youngstown C3, R2 .... 3.15

WIRE RODS

AlabamaCity,Ala. R2 .. 3.85
Buffalo W12 ..... 3.85
Cleveland A7 ..... 3.85
Donora,Pa. A7 ..... 3.85
Fairfield,Ala T2 ..... 3.85
Houston,Tex. S5 ..... 4.25
Ind.Harbor,Ind. Y1 .... 3.85
Johnstown,Pa. B2 .... 3.85
Joliet,Ill. A7 ..... 3.85
LosAngeles B3 ..... 4.65
Minnequa,Colo. C10 .... 4.10
Monessen,Pa. P7 ..... 3.85
No.Tonawanda,N.Y. B11 .4.10
Pittsburg,Calif. C11 ... 4.50
Portsmouth,O. P12 .... 3.85
Roebling,N.J. R5 ..... 3.95
So.Chicago,Ill. R2 .... 3.85
SparrowsPoint B2 .... 3.95
Sterling,Ill.(1) N15 .... 3.85
Struthers,O. Y1 ..... 3.85
Torrance,Calif. C11 .... 4.65

STRUCTURALS

Carbon Steel Stand. Shapes

Aliquippa,Pa. J5 ..... 3.40
Bessemer,Ala. T2 .. .. 3.40
Bethlehem,Pa. B2 ..... 3.45
Clairton,Pa. C3 ..... 3.40
Fairfield,Ala. T2 ..... 3.40
Fontana,Calif. K1 ..... 4.00
Gary,Ind. C3 ..... 3.40
Geneva,Utah G1 ..... 3.40
Houston,Tex. S5 ..... 3.80
Ind.Harbor,Ind. I-2 ... 3.40
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.00
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.00
Minnequa,Colo. C10 .... 3.75
Munhall,Pa. C3 ..... 3.40
Niles,Calif.(22) P1 .... 4.02
Phoenixville,Pa. P4 ... 3.30
Portland,Oreg. O4 ..... 3.90
Seattle B3 ..... 4.05
So.Chicago,Ill. C3, W14 .3.40
So.SanFrancisco B3 ... 3.95
Torrance,Calif. C11 .... 4.00
Weirton,W.Va. W6 .... 3.40

Alloy Stand. Shapes

Clairton,Pa. C3 ..... 4.05
Fontana,Calif. K1 ..... 5.25
Munhall,Pa. C3 ..... 4.05
So.Chicago,Ill. C3 ..... 4.05

H.-S. Low-Alloy Stand. Shapes

Aliquippa,Pa. J5 ..... 5.15
Bessemer,Ala. T2 ..... 5.15
Bethlehem,Pa.(14) B2 .. 5.20
Clairton,Pa. C3 ..... 5.15
Fairfield,Ala. T2 ..... 5.15
Fontana,Calif. K1 ..... 5.75
Gary,Ind. C3 ..... 5.15
Ind.Harbor,Ind. I-2, Y1 .5.15
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y.(14)B2 5.20
Munhall,Pa. C3 ..... 5.15
So.Chicago,Ill. C3 .... 5.15
Struthers,O. Y1 ..... 5.15

Wide Flange

Bethlehem,Pa. B2 ..... 3.45
Lackawanna,N.Y. B2 .. 3.45
Munhall,Pa. C3 ..... 3.40
So.Chicago,Ill. C3 .... 3.40

H-S., L-A. Wide Flange

Munhall,Pa. C3 ..... 5.10
So.Chicago,Ill., C3 .... 5.10

SHEET STEEL PILING

Ind.Harbor,Ind. I-2 ... 4.20
Lackawanna,N.Y. B2 .. 4.20
Munhall,Pa. C3 ..... 4.20
So.Chicago,Ill. C3 .... 4.20
Weirton,W.Va. W6 .... 4.20

PLATES, Carbon Steel

AlabamaCity,Ala. R2 .. 3.50
Aliquippa,Pa. J5 ..... 3.50
Ashland,Ky.(15) A10 .. 3.50
Bessemer,Ala. T2 ..... 3.50
Clairton,Pa. C3 ..... 3.50
Claymont,Del. W16 .... 3.60
Cleveland J5, R2 ..... 3.50
Coatesville,Pa. L7 .... 3.60
Conshohocken,Pa. A3 .. 3.60
Ecorse,Mich. G5 ..... 3.75
Fairfield,Ala. T2 ..... 3.50
Fontana,Calif. K1 .... 4.10
Gary,Ind. C3 ..... 3.50
Geneva,Utah G1 ..... 3.50
Harrisburg,Pa. C5 .... 3.50
Houston,Tex. S5 ..... 3.90
Ind.Harbor,Ind. I-2, Y1.3.50
Johnstown,Pa. B2 .... 3.50
Lackawanna,N.Y. B2 .. 3.50
Minnequa,Colo. C10 .... 4.30
Munhall,Pa. C3 ..... 3.50
Pittsburgh J5 ..... 3.50
Seattle B3 ..... 4.40
Sharon,Pa. S3 ..... 3.50
So.Chicago,Ill. C3, W14.3.50
SparrowsPoint,Md. B2.. 3.50
Steubenville,O. W10 .... 3.50
Warren,O. R2 ..... 3.50
Weirton,W.Va. W6 .... 3.50
Youngstown C3, Y1 ... 3.50

PLATES (Universal Mill)

Fontana,Calif. K1 ..... 4.40

PLATES, Carbon, A.R.

Fontana,Calif. K1 ..... 5.25

PLATES, Open-Hearth Alloy

Coatesville,Pa. L7 ..... 4.50
Conshohocken,Pa. A3 .. 4.40
Fontana,Calif. K1 ..... 5.40
Gary,Ind. C3 ..... 4.40
Johnstown,Pa. B2 ..... 4.40
Munhall,Pa. C3 ..... 4.40
Sharon,Pa. S3 ..... 4.40
So.Chicago, Ill. C3 .... 4.40
SparrowsPoint,Md. B2.. 4.40

PLATES, Wrought Iron

Economy,Pa. B14 ..... 7.85

PLATES,High-Strength Low-Alloy

Aliquippa,Pa. J5 ..... 5.35
Bessemer,Ala. T2 ..... 5.35
Clairton,Pa. C3 ..... 5.35
Cleveland J5, R2 ..... 5.35
Conshohocken,Pa. A3 .. 5.35
Ecorse,Mich. G5 ..... 5.60
Fairfield,Ala. T2 ..... 5.35
Fontana,Calif. K1 .... 5.95
Gary,Ind. C3 ..... 5.35
Geneva,Utah G1 ..... 5.35
Houston,Tex. S5 ..... 5.60
Ind.Harbor,Ind. I-2, Y1.5.35
Johnstown,Pa. B2 ..... 5.35
Munhall,Pa. C3 ..... 5.35
Pittsburgh J5 ..... 5.35
Sharon,Pa. S3 ..... 5.35
So.Chicago,Ill. C3 .... 5.35
SparrowsPoint,Md. B2.. 5.35
Warren,O. R2 ..... 5.35
Youngstown Y1 ..... 5.35

FLOOR PLATES

Cleveland J5 ..... 4.55
Conshohocken,Pa. A3 .. 4.55
Harrisburg,Pa. C5 .... 4.55
Ind.Harbor,Ind. I-2 ... 4.55
Munhall,Pa. C3 ..... 4.55
So.Chicago,Ill. C3 .... 4.55

PLATES, Ingot Iron

Ashland,c.l(15) A10 ... 3.75
Ashland,lcl(15) A10 ... 4.25
Cleveland,cl R2 ..... 4.10
Warren,O.,cl R2 ..... 4.10

BARS, Hot-Rolled Carbon

AlabamaCity,Ala. R2 .. 3.45
Aliquippa,Pa. J5 ..... 3.45
Alton,Ill.(1) L1 ..... 3.45
Ashland,Ky.(17) A10 .. 3.45
Atlanta,Ga. A11 ..... 3.60
Bessemer,Ala. T2 ..... 3.45
Buffalo R2 ..... 3.45
Canton,O. R2 ..... 3.45
Clairton,Pa. C3 ..... 3.45
Cleveland R2 ..... 3.45
Ecorse,Mich. G5 ..... 3.65
Emeryville,Calif. J7 ... 4.20
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y1.3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.05
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.15
Marion,O. P11 ..... 3.35
Midland,Pa. C18 ..... 3.45
Milton,Pa. B6 ..... 3.45
Minnequa,Colo. C10 ... 3.85
Niles,Calif. P1 ..... 4.17
N.Tonawanda,N.Y. B11 .3.45
Pittsburg,Calif. C11 ... 4.15
Pittsburgh, J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
Seattle B3, N14 ..... 4.20
So.Chicago C3, R2, W14.3.45
So.Duquesne,Pa. C3 ... 3.45
S.SanFran.,Cal. B3 .... 4.20
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 ... 4.15
Weirton,W.Va. W6 .... 3.45
Youngstown C3, R2.... 3.45

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 ..... 3.45
Atlanta A11 ..... 3.60
Johnstown,Pa. B2 ..... 3.45
Lackawanna,N.Y. B2 .. 3.45
Niles,Calif. P1 ..... 4.17
Pittsburgh(23) J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
SanFrancisco S7 ..... 4.00
Weirton,W.Va. W6 .... 3.45

BAR SIZE ANGLES; H.R.CARBON

Bethlehem,Pa. B2 ..... 3.65

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 ..... 3.95
Buffalo R2 ..... 3.95
Canton,O. R2 T7..... 3.95
Clairton,Pa. C3 ..... 3.95
Ecorse,Mich. G5 ..... 4.25
Fontana,Calif. K1 ..... 4.95
Gary,Ind. C3 ..... 3.95
Houston,Tex. S5 ..... 4.35
Ind.Harbor,Ind. I-2, Y1.3.95
Johnstown,Pa. B2 ..... 3.95
KansasCity,Mo. S5 .... 4.55
Lackawanna,N.Y. B2 .. 3.95
LosAngeles B3 ..... 5.00
Massillon,O. R2 ..... 3.95
Midland,Pa. C18 ..... 3.95
So.Chicago C3, R2, W14.3.95
So.Duquesne,Pa. C3 ... 3.95
Struthers,O. Y1 ..... 3.95
Warren,O. C17 ..... 3.95
Youngstown C3 ..... 3.95

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. C3 ..... 4.20
Fontana,Calif. K1 ..... 4.95
Gary,Ind. C3 ..... 4.20
Youngstown C3 ..... 4.20

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy

Aliquippa,Pa. J5 ..... 5.20
Bessemer,Ala. T2 ..... 5.20
Bethlehem,Pa. B2 ..... 5.20
Clairton,Pa. C3 ..... 5.20
Cleveland R2 ..... 5.20
Ecorse,Mich. G5 ..... 5.40
Fairfield,Ala. T2 ..... 5.20
Fontana,Calif. K1 ..... 6.25
Gary,Ind. C3 ..... 5.20
Ind.Harbor,Ind. I-2, Y1.5.20
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y. B2 .. 5.20
Pittsburgh J5 ..... 5.20
So.Duquesne,Pa. C3 ... 5.20
Struthers,O. Y1 ..... 5.20
Youngstown C3 ..... 5.20

BARS, Cold-Finished Carbon

Aliquippa,Pa. K5 ..... 4.15
Ambridge,Pa. W18 .... 4.15
BeaverFalls,Pa. M12, R2.4.15
Buffalo B5 ..... 4.15
Camden,N.J. P13 ..... 4.63
Carnegie,Pa. C12 ..... 4.15
Chicago W18 ..... 4.15
Cleveland A7, C20 ..... 4.15
Detroit P17 ..... 4.30
Donora,Pa. A7 ..... 4.15
Ecorse,Mich. G5 ..... 4.30
Elyria,O. W8 ..... 4.15
FranklinPark,Ill. N5 .. 4.15
Gary,Ind. R2 ..... 4.15
Hammond,Ind. L2, M13.4.15
Hartford,Conn. R2 .... 4.55
Harvey,Ill. B5 ..... 4.15
LosAngeles R2 ..... 5.55
Mansfield,Mass. B5 .... 4.55
Massillon,O. R2, R8.... 4.15
Midland,Pa. C18 ..... 4.15
Monaca,Pa. S17 ..... 4.15
Newark,N.J. W18 ..... 4.55
Plymouth,Mich. P5 .... 4.40
Pittsburgh J5 ..... 4.10
Putnam,Conn. W18 .... 4.55
Readville,Mass. C14 ... 4.55
St.Louis,Mo. M5 ..... 4.55
So.Chicago,Ill. W14 .... 4.15
SpringCity,Pa.(5) K3 .. 4.55
Struthers,O. Y1 ..... 4.15
Waukegan,Ill. A7 ..... 4.15
Youngstown F3, Y1.... 4.15

BARS, Cold-Finished Alloy

Aliquippa,Pa. K5 ..... 4.90
Ambridge,Pa. W18 .... 4.90
BeaverFalls,Pa. M12 ... 4.90
Bethlehem,Pa. B2 ..... 4.90
Buffalo B5 ..... 4.90
Canton,O. R2, T7 ..... 4.90
Carnegie,Pa. C12 ..... 4.90
Chicago W18 ..... 4.90
Cleveland A7, C20 ..... 4.90
Detroit P17 ..... 5.05
Donora,Pa. A7 ..... 4.90
Elyria,O. W8 ..... 4.90
Gary,Ind. R2 ..... 4.90
Hammond,Ind. L2, M13.4.90
Hartford,Conn. R2 .... 5.20
Harvey,Ill. B5 ..... 4.90
Lackawanna,N.Y. B2 .. 4.90
Mansfield,Mass. B5 ... 5.20
Massillon,O. R2, R8 ... 4.90
Midland,Pa. C18 ..... 4.90
Monaca,Pa. S17 ..... 4.90
Newark,N.J. W18 ..... 5.20
Plymouth,Mich. P5 .... 5.10
So.Chicago,Ill. R2, W14.4.90
Struthers,O. Y1 ..... 4.90
Waukegan,Ill. A7 ..... 4.90
Warren,O. C17 ..... 4.90
Worcester,Mass. A7 .... 5.20
Youngstown F3, Y1 ... 4.90

BARS, Reinforcing (Fabricators)

AlabamaCity,Ala. R2 ... 3.45
Alton,Ill.(6) L1 ..... 3.45
Atlanta,Ga. A11 ..... 3.60
Buffalo R2 ..... 3.45
Cleveland R2 ..... 3.45
Emeryville,Calif. J7 ... 4.20
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y1.3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.05
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.15
Minnequa,Colo. C10 .... 4.25
Niles,Calif. P1 ..... 4.17
Pittsburg,Calif. C11 ... 4.15
Pittsburgh J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
SandSprings,Okla. S5 .. 4.35
Seattle,Wash. B3, N14.. 4.20
So.Chicago,Ill. R2 ..... 3.45
So.Duquesne,Pa. C3 .... 3.45
So.SanFrancisco B3 ..... 4.20
SparrowsPoint,Md. B2 .. 3.45
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 .... 4.15
Youngstown C3, R2 .... 3.45

BARS, Reinforcing (Fabricated; to Consumers)

Huntington,W.Va. W7 .. 4.50
Johnstown, ¼-1" B2 .. 4.35
LosAngeles B3 ..... 5.00
Marion,O. P11 ..... 4.25
Pittsburgh J5 ..... 4.35
Seattle B3, N14 ..... 5.10
So.SanFrancisco B3 .... 5.00
SparrowsPt., ¼-1" B2 .. 4.35
Williamsport,Pa. S19 ... 4.35

RAIL STEEL BARS

ChicagoHts.,Ill.(3) I-2.. 3.30
ChicagoHts.,Ill.(4) I-2.. 3.45
FortWorth,Tex.(26) T4.. 4.33
Hntngtn,W.Va.(3) W7 .. 3.45
Moline,Ill.(3) R2 ..... 3.35
Williamsport(2,3) S19 .. 3.45

BARS, Wrought Iron

Economy,Pa.(S.R.) B14.9.50
Economy,Pa.(D.R.)B14 11.00
Economy(Stablt) B14.. 11.30
McK.Rks.(S.R.) L5 .... 8.60
McK.Rks.(D.R.) L5 ... 11.25
McK.Rks.(Staybolt) L5.12.75

BARS, Hot-Rolled Ingot Iron

Ashland,Ky. A10 ..... 3.70

SHEETS, Hot-Rolled Steel (18 gage and heavier)

AlabamaCity,Ala. R2 ... 3.35
Ashland,Ky.(8) A10 ... 3.35
Butler,Pa. A10 ..... 3.35
Cleveland J5, R2 ..... 3.35
Conshohocken,Pa. A3 .. 3.45
Ecorse,Mich.(8) G5 .... 3.55
Fairfield,Ala. T2 ..... 3.35
Fontana,Calif. K1 ..... 4.25
Gary,Ind. C3 ..... 3.35
Ind.Harbor,Ind. I-2, Y1.3.35
Irvin,Pa. C3 ..... 3.35
Lackawanna,N.Y. B2 .. 3.35
Munhall,Pa. C3 ..... 3.35
Niles,O. N12 ..... 3.50
Niles,O. M4 ..... 3.75
Pittsburg,Calif. C11 .... 4.05
Pittsburgh J5 ..... 3.35
Sharon,Pa. S3 ..... 3.35
So.Chicago,Ill. W14 .... 3.35
SparrowsPoint,Md. B2 .. 3.35
Steubenville,O. W10 ... 3.35
Torrance,Calif. C11 .... 4.05
Warren,O. R2 ..... 3.35
Weirton,W.Va. W6 ..... 3.35
Youngstown C3, Y1 .... 3.35

SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)

AlabamaCity,Ala. R2 .. 4.50
Dover,O. R1 ..... 4.65
Ind.Harbor,Ind. I-2 .... 4.40
Mansfield,O. E6 ..... 4.15
Niles,O. N12 ..... 4.10
Niles,O. M4 ..... 4.65
Torrance,Calif. C11 .... 5.15

SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy

Cleveland J5, R2 ..... 5.05
Conshohocken,Pa. A3 .. 5.05
Ecorse,Mich. G5 ..... 5.25
Fairfield,Ala. T2 ..... 5.05
Fontana,Calif. K1 .... 6.74
Gary,Ind. C3 ..... 5.05
Ind.Harbor,Ind. I-2, Y1.5.05
Irvin,Pa. C3 ..... 5.05
Lackawanna,N.Y. B2 .. 5.05
Pittsburgh J5 ..... 5.05
Sharon,Pa. S3 ..... 5.05
So.Chicago,Ill. C3 .... 5.05
SparrowsPoint,Md. B2 .. 5.05
Warren,O. R2 ..... 5.05
Weirton,W.Va. W6 .... 5.05
Youngstown C3, Y1 .... 5.05

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland J5, R2 ..... 6.20
Ecorse,Mich. G5 ..... 6.40
Fontana,Calif. K1 ..... 7.10
Gary,Ind. C3 ..... 6.20
Ind.Harbor,Ind. I-2, Y1.6.20
Irvin,Pa. C3 ..... 6.20
Lackawanna,N.Y. B2 .. 6.20
Pittsburgh J5 ..... 6.20
Sharon,Pa. S3 ..... 6.20
SparrowsPoint,Md. B2 .. 6.20
Warren,O. R2 ..... 6.20
Weirton,W.Va. W6 .... 6.20
Youngstown Y1 ..... 6.20

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SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.10
Cleveland J5, R2	4.10
Ecorse,Mich. G5	4.30
Fairfield,Ala. T2	4.10
Follansbee,W.Va. F4	4.10
Fontana,Calif. K1	5.00
Gary,Ind. C3	4.10
GraniteCity,Ill. G4	4.30
Ind.Harbor,Ind. I-2, Y1	4.10
Irvin,Pa. C3	4.10
Lackawanna,N.Y. B2	4.10
Middletown,O. A10	4.10
Pittsburgh,Calif. C11	5.05
Pittsburgh J5	4.10
SparrowsPoint,Md. B2	4.10
Steubenville,O. W10	4.10
Warren,O. R2	4.10
Weirton,W.Va. W6	4.10
Youngstown Y1	4.10

SHEETS, Gal'zd No. 10 Steel

AlabamaCity,Ala. R2	4.40
Ashland,Ky.(8) A10	4.40
Canton,O. R2	4.40
Delphos,O. N16	5.15
Dover,O. R1	4.75
Fairfield,Ala. T2	4.40
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Kokomo,Ind. C16	4.50
MartinsFerry,O. W10	4.40
Niles,O. N12	4.65
Pittsburg,Calif. C11	5.15
SparrowsPoint,Md. B2	4.40
Steubenville,O. W10	4.40
Torrance,Calif. C11	5.15
Weirton,W.Va. W6	4.40

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. C3	6.75
SparrowsPoint,Md. B2	6.75

SHEETS, Gavannealed Steel

Canton,O. R2	4.95
Irvin,Pa. C3	4.95
Kokomo,Ind. C16	5.05
Niles,O. N12	5.20

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	4.65
Middletown,O. A10	4.65

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.25
Niles,O. R2 (28)	5.25
Weirton,W.Va. W6	5.10

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.05

SHEETS, Well Casing

Torrance,Calif. C11	4.85
Youngstown C3	3.85

SHEETS, Drum Body

Pittsburg,Calif. C11	3.95
Torrance,Calif. C11	3.95

SHEETS, ALUMINIZED

Butler,Pa. A10	7.75

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBotm, W.V. W10	4.80
Gary,Ind. C3	4.80
Mansfield,O. E6	4.80
Middletown,O. A10	4.80
Niles,O. N12	4.80
Weirton,W.Va. W6	4.80

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.20

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3	$17.50
Yorkville,O. W10	17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$6.60
Gary,Ind. C3	6.50
Ind.Harbor I-2	6.50
Irvin,Pa. C3	6.50
Yorkville,O. W10	6.50

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10	$7.20

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3	$8.10
Yorkville,O. W10	8.10

SHEETS, Coated Ternes, 12 lb

Yorkville,O. W10	8.95

SHEETS, Culvert, No. 16

	Cu Alloy	Cu Fe
Ashland A10	5.20	...
Canton,O. R2	5.25	5.70
Fairfield,Ala. T-2	5.20	5.45
Gary C3	5.20	5.45
GraniteCity G4	5.40	5.70
IndianaHarbor I-2	5.20	5.45
Irvin C3	5.20	5.45
Kokomo C16	5.40	...
MartinsFy.O. W10	5.20	5.45
Pittsburg,Cal. C11	5.95	...
SparrowsPt, B2	5.20	...
Torrance,Cal. C11	5.95	...

SHEETS, Culvert, No. 16 Corrugated Ingot Iron

Ashland,Ky. A10	5.45

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10	3.60
Cleveland R2	3.95
Ind.Harbor,Ind. I-2	3.60
Warren,O. R2	3.95

SHEETS, Cold-Rolled Ingot Iron

Cleveland R-2	4.70
Middletown,O. A10	4.60
Warren,O. R2	4.70

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10	4.65
Canton,O. R2	5.15
Ind.Harbor,Ind. I-2	4.80

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	4.90
Middletown,O. A10	4.90

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$6.35	$6.60	$6.85
Fairfield,Ala. T2	6.45	6.70	6.95
Gary,Ind. C3	6.35	6.60	6.85
GraniteCity,Ill. G4	6.55	6.80	7.05
Ind.Harbor,Ind. I-2, Y1	6.35	6.60	6.85
Irvin,Pa. C3	6.35	6.60	6.85
Niles,O. R2	6.35	6.60	6.85
Pittsburg,Calif. C11	7.10	7.35	7.60
SparrowsPoint,Md. B2	6.45	6.70	6.95
Weirton,W.Va. W6	6.35	6.60	6.85
Yorkville,O. W10	6.35	6.60	6.85

SHEETS, SILICON, H.R. or C.R. (22 Ga.) Coils (Cut Lengths ½c lower)

	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	6.95	7.45	8.45	9.25
Brackenridge,Pa. A4	...	...	7.45	8.45	9.25
Follansbee,W.Va. F4	...	...	7.45	8.45	9.25
GraniteCity,Ill. G4	...	...	7.65	8.65	...
Ind.Harbor,Ind. I-2	6.40	6.70	(34)	...	...
Vandergrift,Pa. C3	...	6.95	7.45	8.45	9.25
Warren,O. R2	6.40	6.70	7.20	8.45	9.25
Zanesville,O. A10	6.70	7.20	7.45	8.45	9.25

SHEETS, SILICON (24 Ga. Base)

Mansfield,O. E6	5.90	6.20	6.70	7.95	8.75
Niles,O. M4	5.65	5.95	6.45	...	...
Niles,O. N12	...	6.45	6.95	...	...

SHEETS, SILICON (22 Gage Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom,W.Va. W10	9.80	10.35	11.05	11.85
Brackenridge,Pa. A4	9.80	10.35	11.05	...
Follansbee,W.Va. F4	9.80	10.35	11.05	11.85
Vandergrift,Pa. C3	9.80	10.35	11.05	11.85
Warren,O. R2	9.80	...	...	...
Zanesville,O. A10	9.80	10.35	11.05	11.85

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)

	T-100	T-90	T-80
Vandergrift,Pa. C3	12.35	13.60	14.85
Zanesville,O. A10	13.20	14.20	14.70

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$7.30	$7.50
Fairfield,Ala. T2	7.40	7.60
Gary C3	7.30	7.50
Gran.City,Ill. G4	7.50	7.70
Ind.Harb. I-1, Y1	7.30	7.50
Irvin,Pa. C3	7.30	7.50
Pitts.Cal. C11	8.05	8.25
Sp.Pt.,Md. B2	7.40	7.60
Warren R2	7.30	7.50
Weirton W6	7.30	7.50
Yorkville,O. W10.	7.30	7.50

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$5.60
Fairfield,Ala. T2	5.70
Gary,Ind. C3	5.60
GraniteCity,Ill. G4	5.80
Ind.Harbor,Ind. I-2, Y1	5.60
Irvin,Pa. C3	5.60
Niles,O. R2	5.60
Pittsburg,Calif. C11	6.35
SparrowsPoint,Md. B2	5.70
Warren,O. R2	5.60
Weirton,W.Va. W6	5.60
Yorkville,O. W10	5.60

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5	5.30
Follansbee,W.Va. F4	5.30
Gary,Ind. C3	5.30
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. C3	5.30
Niles,O. R2	5.30
SparrowsPoint,Md. B2	5.40
Warren,O. R2	5.30
Yorkville,O. W10	5.30

SHEETS, Enam'lg. Iron

Ashland,Ky.(8) A10	4.40
Cleveland R2	4.40
Ecorse,Mich. G5	4.70
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Middletown,O. A10	4.40
Niles,O. M4	4.90
Youngstown Y1	4.40

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	4.95
Conshohocken,Pa. A3	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	4.95
Fontana,Cal. K1	6.64
Gary,Ind. C3	4.95
Ind.Harb.,Ind. I-2, Y1.	4.95
Lackawanna,N.Y. B2	4.95
Sharon,Pa. S3	4.95
SparrowsPoint,Md. B2	4.95
Warren,O. R2	4.95
Weirton,W.Va. W6	4.95
Youngstown C3, Y1	4.95

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.10
Carnegie,Pa. S18	5.10
Fontana,Calif. K1	6.30
Gary,Ind. C3	5.10
Houston,Tex. S5	5.50
KansasCity,Mo. S5	5.70
NewBritn,Conn.(10) S15	5.10
Sharon,Pa. S3	5.10
Youngstown C3	5.10

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.50
Warren,O. R2	3.85

STRIP, Hot-Rolled Carbon

Alton,Ill.(1) L1	3.25
Ashland,Ky.(8) A10	3.25
Atlanta A11	3.40
Bessemer,Ala. T2	3.25
Bridgeprt,Conn.(10) S15	3.25
Butler,Pa. A10	3.25
Carnegie,Pa. S18	3.25
Conshohocken,Pa. A3	3.35
Detroit M1	3.55
Ecorse,Mich. G5	3.45
Fairfield,Ala. T2	3.25
Fontana,Calif. K1	4.40
Gary,Ind. C3	3.25
Houston,Tex. S5	3.65
Ind.Harbor,Ind. I-2, Y1.	3.25
KansasCity,Mo.(9) S5	3.85
Lackawanna,N.Y. B2	3.25
LosAngeles B3	4.00
Milton,Pa. B6	3.25
Minnequa,Colo. C10	4.30
NewBritain(10) S15	3.25
N.Tonawanda,N.Y. B11.	3.25
Pittsburg,Calif. C11	4.00
Riverdale,Ill. A1	3.25
SanFrancisco S7	3.90
Seattle B3, N14	4.25
Sharon,Pa. S3	3.25
So.Chicago,Ill. W14	3.25
So.SanFrancisco B3	4.00
SparrowsPoint,Md. B2	3.25
Torrance,Calif. C11	4.00
Warren,O. R2	3.25
Weirton,W.Va. W6	3.25
WestLeechburg,Pa. A4	3.25
Youngstown C3, Y1	3.25

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15.	9.50
Carnegie,Pa. S18	9.50
Cleveland A7	9.50
Dover,O. G6	9.50
Harrison,N.J. C18	9.80
NewBritn,Conn.(10) S15.	9.50
Pawtucket,R.I.(11) NS.	9.50
Pawtucket,R.I.(12) NS.	9.80
Sharon,Pa. S3	9.50
Worcester,Mass. A7	9.80
Youngstown C8	9.50

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	4.75

STRIP, Cold-Rolled Carbon

Berea,O. C7	6.30
Bridgeprt,Conn.(10) S15.	4.25
Butler,Pa. A10	4.25
Cleveland A7, J5	4.25
Dearborn,Mich. D3	4.60
Detroit, D2	4.60
Detroit M1	4.25
Dover,O. G6	4.25
Ecorse,Mich. G5	4.25
Follansbee,W.Va. F4	4.25
Fontana,Calif. K1	5.40
FranklinPark,Ill. T6	4.30
Ind.Harbor,Ind. I-2	4.30
Lackawanna,N.Y. B2	4.15
LosAngeles C1	5.50
Mattapan,Mass.(21) T6	*4.65*
Middletown,O. A10	4.25
NewBritain(10) S15	4.25
NewCastle,Pa. B4, E5	4.15
NewHaven,Conn. A7, D2	4.65
NewYork W3	5.00
Pawtucket,R.I.(11) NS.	4.70
Pawtucket,R.I.(21) NS.	4.65
Riverdale,Ill. A1	4.30
Sharon,Pa.(30) S3	4.15
SparrowsPoint,Md. B2	4.15
Trenton,N.J.(13) R5	4.65
Wallingford,Conn. W2	4.65
Warren,O.(25) T5	4.15
Warren,O. R2	4.15
Weirton,W.Va. W6	4.25
Youngstown Y1	4.15
Youngstown C8	4.15

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland A7, J5	6.20
Dover,O. G6	6.20
Ecorse,Mich. G5	6.40
Fontana,Calif. K1	6.95
Lackawanna,N.Y., B2	6.40
Sharon,Pa. S3	6.20
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.20
Weirton,W.Va. W6	6.20
Youngstown Y1	6.20

STRIP, Electro Galvanized

Weirton,W.Va. W6	4.15
Youngstown C8	4.15

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.25-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Bridgeport,Conn.(10) S15	4.15	5.95	6.55	8.50	10.80
Bristol,Conn. W1	...	...	6.40	8.35	....
Carnegie,Pa. S18	...	5.95	6.55	8.50	10.80
Cleveland A7	4.15	5.95	6.55	8.50	10.80
Dover,O. G6	4.15	5.95	6.55	8.50	10.80
FranklinPark,Ill. T6	4.40	6.10	6.70	8.65	....
Harrison,N.J. C18	...	...	6.85	8.80	11.10
Mattapan,Mass. T6	*4.65*	*6.25*	*6.85*	*8.80*	*11.10*
NewBritn.,Conn.(10) S15	4.15	5.95	6.55	8.50	10.80
NewCastle,Pa. B4	4.15	5.95	6.55	8.50	....
NewCastle,Pa. E5	4.15	5.95	6.55	8.50	10.80
NewYork W3	...	6.30	6.90	8.85	11.15
Pawtucket,R.I. N8:					
Cleve.orPitts.Base (29)	4.55	5.50	6.10	8.05	10.35
Worcester,Base (29)	4.50	5.80	6.40	8.35	10.65
Sharon,Pa. S3	4.15	5.95	6.55	8.50	10.80
Trenton,N.J. R5	...	6.30	6.90	8.85	11.15
Wallingford,Conn. W2	4.65	6.25	6.85	8.80	11.10
Weirton,W.Va. W6	4.15	5.95	6.55	8.50	10.80
Worcester,Mass. A7	4.45	6.25	6.85	8.80	11.10
Worcester,Mass. T6	*4.65*	*6.25*	*6.85*	*8.80*	*11.10*
Youngstown C8	4.50	5.50	6.10	8.05	10.35
Spring Steel (Tempered)					
Trenton,N.J. R5	...	...	9.35	11.30	13.90

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel& Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bolardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B14 A. M. Byers Co.

C1 Calif. Cold-Rolled Steel
C3 Carnegie-Illinois Steel
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Clev. Cld.Roll.MillsCo.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Co.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F6 Fretz-Moen Tube Co.

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H4 Heppenstall Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K5 Kidd Drawn Steel Co.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

TIGHT COOPERAGE HOOP

Atlanta A11	3.60
Riverdale,Ill. A1	3.60
Sharon,Pa. S3	3.60
Youngstown C3	3.60

WIRE, Cold-Rolled Flat

Cleveland A7	5.35
Dover,O. G6	5.15
Fostoria,O. S1	5.50
Kokomo,Ind. C16	5.35
FranklinPark,Ill. T6	5.70
Massillon,O. R8	5.35
Monessen,Pa. P7	5.35
Pawtucket,R.I.(11) N8	5.70
Pawtucket,R.I.(12) N8	5.65
Trenton,N.J. R5	5.65
Worcester,Mass. A7	5.65
Worcester,Mass. T6	5.30

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(1) K4	8.45
Buffalo W12	8.45
Chicago W13	8.45
Cleveland A7	8.05
Crawfrdsvil,Ind. M8	8.60
Fostoria,O. S1	8.45
Johnstown,Pa. B2	7.70
Kokomo,Ind. C16	8.45
Palmer,Mass. W12	8.75
Portsmouth,O. P12	8.45
Roebling,N.J. R5	8.75
Waukegan,Ill. A7	8.05
Worcester,Mass. T6	*8.75*
Worcester,Mass. A7	8.35

WIRE (16 gage)	An'ld. Galv. Stone	Stone
Aliquippa J5	9.80	11.30
Bartonville(1) K4	9.80	11.30
Cleveland A7	9.80	11.30
Crawfrdsvil M8	9.95	11.45
Fostoria,O. S1	9.90	11.40
Johnstown B2	9.80	11.30
Kokomo C16	9.80	11.30
Minnequa C10	9.40	10.90
Palmer,Mass. W12	9.35	10.85
Pitts.,Cal. C11	9.75	11.25
Prtsmth.(18) P12	9.80	11.30
SparrowsPt. B2	9.90	11.40
Waukegan A7	9.80	11.30

WIRE, Galv'd ASCR Core

Roebling,N.J. R5	8.45

WIRE, Tire Bead

Roebling,N.J. R5	10.80

ROPE WIRE	Mild Plow	Plow	Imp. Plow
Bartonville,Ill. K4	8.05	8.05	8.30
Buffalo W12	*8.05*	*8.05*	*8.30*
Cleveland A7	8.05	8.05	8.30
Donora,Pa. A7	8.05	8.05	8.30
Fostoria,O. S1	8.05	8.05	8.30
Johnstown,Pa. B2	7.50	7.80	8.20
Monessen,Pa. P7	8.05	8.05	8.30
NewHaven,Conn. A7	8.35	8.35	8.60
Palmer,Mass. W12	*8.05*	*8.05*	*8.30*
Portsmouth,O. P12	8.05	8.05	8.30
Roebling,N.J. R5	8.35	8.35	8.60
SparrowsPoint,Md. B2	7.60	7.90	8.30
Struthers,O. Y1	8.05	8.05	8.30
Trenton,N.J. R5	8.35	8.35	8.60
Waukegan,Ill. A7	8.05	8.05	8.30
Williamsport,Pa. B2	7.60	7.90	8.30
Worcester,Mass. J4, T6	*8.35*	*8.35*	*8.60*

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity,Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Atlanta A11	4.60
Alton,Ill.(1) L1	4.50
Bartonville,Ill.(1) K4	4.50
Buffalo W12	4.50
Chicago W13	4.50
Cleveland C20	4.15
Cleveland A7	4.50
Crawfrdsvil,Ind. M8	4.65
Donora,Pa. A7	4.50
Duluth A7	4.50
Fairfield,Ala. T2	4.50
Fostoria,O.(24) S1	4.85
Houston S5	4.90
Johnstown,Pa. B2	4.50
Joliet,Ill. A7	4.50
KansasCity,Mo. S5	5.10
Kokomo,Ind. C16	4.60
LosAngeles B3	*5.45*
Minnequa,Colo. C10	4.75
Monessen,Pa. P7	4.50
Newark,6-8ga. I-1	5.15
No.Tonawanda B11	4.90
Palmer,Mass. W12	4.80
Pittsburg,Calif. C11	5.45
Portsmouth,O. P12	4.50
Rankin,Pa. A7	4.50
So.Chicago,Ill. R2	4.50
So.SanFrancisco C10	5.10
SparrowsPoint,Md. B2	4.60
Sterling,Ill.(1) N15	4.50
Struthers,O. Y1	4.50
Torrance,Calif. C11	5.45
Waukegan,Ill. A7	4.50
Worcester,Mass. T6	4.45
Worcester,Mass. A7	4.80

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	5.90
Bartonville,Ill.(1) K4	5.90
Buffalo W12	5.90
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Fostoria,O. S1	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	*6.85*
Milbury,Mass.(12) N6	6.20
Monessen,Pa. P7	5.90
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Struthers,O. Y1	5.90
Trenton,N.J. A7	5.85
Waukegan,Ill. A7	5.55
Worcester,Mass. A7	5.85
Worcester J4, W12	6.20
Worcester,Mass. T6	*6.20*

WIRE, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
Ala.City R2	5.35	5.60
Aliquippa J5	5.35	5.60
Atlanta A11	5.25	5.70
Bartnville(19) K4	5.35	5.60
Buffalo(31) W12	4.50	...
Cleveland A7	5.35	5.60
Crawfrdvil. M8	5.50	5.75
Donora A7	5.35	5.60
Duluth A7	5.35	5.60
Fairfield T2	5.35	5.60
Houston,Tex. S5	5.75	6.00
Johnstown B2	5.35	5.60
Joliet,Ill. A7	5.35	5.60
KansasCy,Mo. S5	5.95	6.20
Kokomo C16	5.45	5.70
LosAngeles B3	6.30	...
Minnequa C10	5.60	5.85
Monessen P7	5.35	5.60
Palmer(31) W12	4.80	...
Pitts.,Cal. C11	6.10	6.55
Prtsmth.(18) P12	5.35	5.60
Rankin A7	5.35	5.60
So.Chicago R2	5.35	5.60
So.S.Fran. C10	5.75	6.20
SparrowsPt. B2	5.45	5.70
Sterling,Ill.(1)N15	5.35	5.60
Struthers,O. Y1	5.35	5.60
Torrance,Cal. C11	6.10	...
Worcester A7	5.65	5.90

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.55
Alton,Ill.(1) L1	5.55
Buffalo W12	5.55
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Johnstown,Pa. B2	5.55
LosAngeles B3	6.50
Monessen P7	5.55
NewHaven,Conn. A7	5.85
Palmer,Mass. W12	5.85
Pittsburg,Calif. C11	6.50
Portsmouth,O. P12	5.55
Roebling,N.J. R5	5.85
So.Chicago,Ill. R2	5.55
SparrowsPoint,Md. B2	5.65
Struthers,O. Y1	5.55
Torrance,Calif. C11	6.50
Trenton,N.J. A7	5.85
Waukegan,Ill. A7	5.55
Worcester,Mass. A7	5.85

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	126
Aliquippa,Pa. J5	126
Atlanta A11	128
Bartonville,Ill.(19) K4	126
Crawfordsville M8	129
Donora,Pa. A7	126
Duluth,Minn. A7	126
Fairfield,Ala. T2	126
Houston,Tex. S5	134
Johnstown,Pa. B2	126
Joliet,Ill. A7	126
KansasCity,Mo. S5	138
Kokomo,Ind. C16	128
Minnequa,Colo. C10	131
Monessen,Pa. P7	126
Pittsburg,Calif. C11	146
Portsmouth,O.(18) P12	126
Rankin,Pa. A7	126
So.Chicago,Ill. R2	126
So.SanFran.,Calif. C10	143
SparrowsPoint,Md. B2	128
Sterling,Ill.(1) N15	126

FENCE POSTS

	Col.
Duluth A7	112
Huntington,W.Va. W7	116
Johnstown,Pa. B2	112
Joliet,Ill. A7	112
Minnequa,Colo. C10	121
Moline,Ill. R2	116
Williamspt,Pa. S19	120

WOVEN FENCE, 9-15½ gage

	Col.
Ala.City,Ala.,17-18ga.R2	198
AlabamaCity,Ala. R2	116
Aliquip.,Pa.9-14½ga. J5	116
Atlanta A11	118
Bartonville,Ill.(19) K4	116
Crawfordsvil,Ind. M8	119
Donora,Pa. A7	116
Duluth A7	116
Houston,Tex. S5	124
Fairfield,Ala. T2	116
Johnstown,Pa. B2	116
Johnstn,17ga.,6" B2	190
Johnstn,17ga.,4" B2	193
Joliet,Ill. A7	116
KansasCity,Mo. S5	128
Kokomo,Ind. C16	118
Minnequa,Colo. C10	121
Monessen,Pa. P7	116
Pittsburg,Calif. C11	139
Portsmouth,O.(18) P12	116
Rankin,Pa. A7	116
So.Chicago,Ill. R2	116
Sterling,Ill.(1) N15	116

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	113
Atlanta A11	114
Bartonville,Ill.(19) K4	113
Chicago W13	113
Crawfordsville M8	116
Donora,Pa. A7	113
Duluth A7	113
Fairfield,Ala. T2	113
Joliet,Ill. A7	113
KansasCity,Mo. S5	125
Kokomo,Ind. C16	115
Minnequa,Colo. C10	118
Pittsburg,Calif. C11	137
Portsmouth,O.(18) P12	113
So.Chicago,Ill. R2	113
So.SanFran.,Calif. C10	130
SparrowsPoint,Md. B2	115
Steling,Ill.(1) N15	113

NAILS & STAPLES, Stock To Dealers & Mfrs. (7)

AlabamaCity,Ala. R2	106
Aliquippa,Pa. J5	106
Atlanta A11	108
Bartonville,Ill.(19) K4	106
Chicago,Ill. W13	106
Cleveland A9	112
Crawfordsville M8	109
Donora,Pa. A7	106
Duluth A7	106
Fairfield,Ala. T2	106
Galveston,Tex. D7	114
Houston,Tex. S5	114
Johnstown,Pa. B2	106
Joliet,Ill. A7	106
KansasCity,Mo. S5	118
Kokomo,Ind. C16	108
Minnequa,Colo. C10	111
Monessen,Pa. P7	106
Pittsburg,Calif. C11	125
Portsmouth,O. P12	106
Rankin,Pa. A7	106
So.Chicago,Ill. R2	106
SparrowsPoint,Md. B2	108
Sterling,Ill.(1) N15	106
Torrance,Calif. C11	126
Worcester,Mass. A7	112

RAILS	Std. No. 1	Std. No. 2	Std. Alt No. 2	TeeRails 60 lb Under
Bessemer,Pa. C3	3.40	3.30	3.35	3.75
Ensley,Ala. T2	3.40	3.30	...	3.75
Fairfield,Ala. T2	...	...	...	3.75
Gary,Ind. C3	3.40	3.30	3.35	...
Huntington,W.Va. W7	...	...	...	3.75
Ind.Harbor,Ind. I-2	3.40	3.30	3.35	...
Johnstown,Pa. B2	...	...	...(16)	3.75
Lackawanna B2	3.40	3.30	...	3.75
Minnequa,Colo. C10	3.40	3.30	...	4.25
Steelton,Pa. B2	3.40	3.30	...	...

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	5.35
Bartonville,Ill.(19) K4	5.35
Crawfrdsvil,Ind. M8	5.50
Donora,Pa. A7	5.35
Duluth A7	5.35
Johnstown,Pa. B2	5.35
Joliet,Ill. A7	5.35
Kokomo,Ind. C16	5.45
Minnequa,Colo. C10	5.60
Pittsburg,Calif. C11	6.30
Portsmouth,O. P12	5.35
Rankin,Pa. A7	5.35
So.Chicago,Ill. R2	5.35
SparrowsPoint,Md. B2	5.45
Worcester,Mass. A7	5.65

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa. A3	$6.75
Wheeling,W.Va. W10	6.75

AXLES

Fairfield,Ala. T2	5.25
Gary,Ind. C3	5.25
Ind.Harbor,Ind. S13	5.25
Johnstown,Pa. B2	5.25
McKeesRocks,Pa. C3	5.25

TIE PLATES

Fairfield,Ala. T2	4.20
Gary,Ind. C3	4.20
Ind.Harbor,Ind. I-2	4.20
Lackawanna,N.Y. B2	4.20
Minnequa,Colo. C10	4.20
Pittsburg,Calif. C11	4.35
Pittsburgh R2	4.20
Seattle B3	4.65
Steelton,Pa. B2	4.20
Torrance,Calif. C11	4.35
Weirton,W.Va. W6	4.20

JOINT BARS

Bessemer,Pa. C3	4.40
Fairfield,Ala. T2	4.40
Ind.Harbor,Ind. I-2	4.40
Joliet,Ill. C3	4.40
Lackawanna,N.Y. B2	4.40
Minnequa,Colo. C10	4.40
Steelton,Pa. B2	4.40

TRACK BOLTS (20) Treated

Fairfield,Ala. T2	8.50
KansasCity,Mo. S5	9.10
Lebanon,Pa.(32) B2	8.85
Minnequa,Colo. C10	8.25
Pittsburgh,Pa. O3, P14	9.10
Seattle B3	*9.35*

STANDARD TRACK SPIKES

Fairfield,Ala. T2	5.35
Ind.Harbor,Ind. I-2, Y1	5.35
KansasCity,Mo. S5	5.85
Lebanon,Pa. B2	5.60
Minnequa,Colo. C10	5.35
Pittsburgh J5	5.60
Seattle B3	*6.10*
So.Chicago,Ill. R2	5.35
Struthers,O. Y1	5.35
Youngstown R2	5.35

Key to Producing Companies

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M10 Missouri-Illinois Furnace
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.
N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 New EngHighCarb Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll.Mills
N15 Northwestern S.&W. Co.
N16 New Dolphos Mfg. Co.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills.
P1 Pacific States Steel Corp.
P2 Pacific Tube Co
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,Eaton Mfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S & I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U4 Universal Cyclops Steel
V2 Vanadium Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Corp.
W7 W. Va. Steel & Mfg. Co.
W8 Wstrn.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.
Y1 Youngstwn Sheet & Tube

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	21.00	18W,4Cr,3V	126.00
Extra Carbon	24.50	18W,4Cr,2V,9Co	185.50
Spec. Carbon	29.50	18W,4Cr,2V,6Co	169.50
Oil Hardening	32.00	18.25W,4.25Cr,1V,4.75Co	156.50
Cr Hot Wrk.	32.00	20.25W,4.25Cr,1.6V,12.25Co	293.50
Hi-Carbon-Cr	57.50	1.5W,4Cr,1V,8.5Mo	71.50
18W,4Cr,1V	100.00	6.4W,4.5Cr,1.9V,5Mo	76.50
18W,4Cr,2V	113.00	6W,4Cr,3V,6Mo	97.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, M14, R2, S8, T7, U4, V2, V3.

(1) Chicago Base. (2) Angles.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. Base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh Base.
(11) Cleveland & Pittsburgh Base.
(12) Worcester, Mass. Base.
(13) 3" & wider; over ½" to under 3" 5.15c.
(14) Also wide flange beams.
(15) ½" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh Base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. Base.
(22) Del. San Fran. Bay area.
(23) Angles 1"x1" to 1¼"x1¼" only.
(24) Deduct 0.35c for finer than 15 Ga.
(25) Up to 0.035 C; 4.40c, 0.035 C and over.
(26) Reinforcing, mill shipments; to consumers, 4.83c; fabricated to fabricators, 4.58c.
(27) 22 Gage; hot or cold-reduced.
(28) Bonderized.
(29) 0.26-0.40 C.
(30) 0.40 C and less.
(31) Not annealed.
(32) Untreated.
(33) To jobbers, deduct 20 cents.
(34) 6.70c for cut lengths.

UNIVERSITY OF MICHIGAN LIBRARIES

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.5c	0.24	36.5	34.5	...	8.5	9	...
¼	6.0	0.42	33.5	31.5	...	9.5	11	...
⅜	6.0	0.57	29	27	...	5.5	8	...
½	8.5	0.85	40.5	38.5	39.5	24.0	22.0	23.0
¾	11.5	1.13	43.5	41.5	42.5	28.0	26.0	27.0
1	17.0	1.68	46.0	44.0	45.0	31.0	29.0	30.0
1¼	23.0	2.28	46.5	44.5	45.5	31.5	29.5	30.5
1½	27.5	2.73	47.0	45.0	46.0	32.0	30	31.0
2	37.0	3.68	47.5	45.5	46.5	32.5	30.5	31.5
2½	58.5	5.82	48.0	46.0	47.0	33.0	31.0	32.0
3	76.5	7.62	48.0	46.0	47.0	33.0	31.0	32.0

Column A: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 1½ percentage points lower on ⅛", 2 points lower on ¼", 3 points lower on ⅜", W10. Wheatland, Pa., 2 pts lower on ⅛" through ⅜", W9. Following make ½" and larger: Lorain, O. N3; Youngstown, plus 42% on 3½" and 4", R2; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 31% on 3½" and 4".

Columns B & E: Sparrows Point Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1.

Column D: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa., ⅛" through ⅜", F6; Benwood, W. Va., except 3½ points lower on ⅛", 2½ pts on ¼", 3 pts on ⅜" W10. Wheatland, Pa., except 2 pts lower on ⅛" through ⅜", W9. Following make ½" and larger: Lorain N3; Youngstown, plus 26.5% on 3½" and 4", R2; Youngstown, Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 15.5% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	36.0	20.5	36.0	20.5
2½	58.5	5.82	39.0	23.5	39.0	23.5
3	76.5	7.62	39.0	23.5	39.0	23.5
3½	92.0	9.20	41.0	25.5	41.0	25.5
4	$1.09	10.89	41.0	25.5	41.0	25.5
5	1.48	14.81	41.0	25.5	41.0	25.5
6	1.92	19.18	41.0	25.5	41.0	25.5

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	12.36	14.39	13.96	13.96
1¼	13	14.63	17.05	14.19	16.54
1½	13	16.17	19.02	15.68	18.45
1¾	13	18.39	21.64	17.84	20.99
2	13	20.61	24.24	19.99	23.51
2¼	13	22.96	27.03	22.27	26.22
2½	12	25.29	29.76	24.53	28.87
2½	12	27.71	32.58	26.88	31.60
2¾	12	29.36	34.53	28.48	33.49
3	12	30.82	36.27	29.90	35.18
3¼	11	35.87	42.22	34.79	40.95
3½	11	38.52	45.35	37.36	43.99
4	10	47.82	56.25	46.39	54.56
4½	9	63.37	74.59	61.47	72.35
5	9	73.37	86.32	71.17	83.73
6	7	112.62	132.51	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

CLAD STEELS

(Cents per pound)

Cladding Stainless	Plates Carbon Base 10%	Plates Carbon Base 20%	Strip Cold-Rolled Carbon Base 10%	Strip Cold-Rolled Carbon Base Both sides	Sheets Carbon Base 10%	Sheets Carbon Base 20%	Sheets Copper Base Both Sides
302	....	....	....	....	19.75	21.50–22.50	75.00
304	22.50	26.50	....	....	20.75	22.50–24.00	77.00
305	....	....	....	....	....	....	79.00
309	27.00	31.00	....	....	....	....	....
310	32.50	36.50	....	....	....	....	105.00
316	27.00	31.00	....	....	26.00	28.00–32.00	....
317	30.50	34.50	....	....	....	....	....
318	29.50	33.50	....	....	....	....	....
321	23.50	27.50	....	....	23.00	25.00	90.00
347	25.00	29.00	....	....	24.00	26.00–30.00	94.00
405	18.75	24.75	....	....	....	....	....
410	18.25	24.25	....	....	....	....	....
430	18.25	24.25	....	....	....	....	....
Nickel	27.50	34.50	31.50	41.00	....	....	88.00
Inconel	36.00	46.00	....	....	....	....	115.00
Monel	29.00	37.00	26.50	33.50	....	....	83.00
Copper*	....	....	19.75†	23.75†	....	....	....

* Deoxidized. † Deduct 4.25c for hot-rolled. Production joints for carbon base products: Stainless plates and sheets, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16 and Coatesville, Pa. L7; nickel, inconel and monel-clad plates, Coatesville L7; nickel, monel and copper-clad strip, Carnegie, Pa. S18. Production point for copper-base sheets is Carnegie A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:	
½-in. & smaller diam.	27
⅝-in. & ⅞-in.	29
1-in. and larger	26
Longer than 6 in.:	
All diams.	22
Lag bolts, all diams.:	
6 in. and shorter	30
over 6 in. long	28
Ribbed Necked Carriage	26
Blank	40
Plow	40
Step, Elevator, Tap, and Sleigh Shoe	28
Tire bolts	20
Boiler & Fitting-Up Bolts	37

NUTS

H.P. & C.P. Reg. & Heavy Square:	Reg.	Heavy
½-in. and smaller	25	
⅝-in. & ¾-in.	23	
⅞-in.-1½-in.	23	
1⅝ in. and larger	16	
H.P. Hex.:		
½-in. & smaller	33	29
⅝-in. & ¾-in.	28	25
⅞-in.-1½-in.	25	23
1⅝ in. & larger	17	16
C.P. Hex.:		
½-in. & smaller	33	29
⅝-in. & ¾-in.	30	27
⅞-in. & 1½ in.	27	24
1⅝ in. & larger	20	17

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

	Hvy.	Reg.	Lght.
½-in. and smaller	35	41	41
⅝-in. & ¾-in.	30	36	36
⅞-in.-1½ in.	27	31	33
1⅝-in. & larger	17	21	..

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish	63.5 & 10
Plated finishes	50 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:	
¼-in. through ⅝-in.	50
⅜-in. through 1 in.	43
Longer than 6 in.:	
¼-in. through ⅝-in.	33
¾-in. through 1 in.	13

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam x 6 in. and shorter	46
1 in. and smaller diam. x over 6 in.	33

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller	41
¼-in. diam. & larger	24
N.F. thread, all diams.	18

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger	7.25c
⅞-in., under	43 off

Washers, Wrought

F.o.b. shipping point, to jobbers ..... Net to $1 off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	Inches Length	Cents per lb.
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4, 5⅛	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00
CARBON		
40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	34,90	7.50
14	60,72	8.00
10,12	60	8.25

STAINLESS STEEL

(cents per pound)

Type	Sheets	C.R. Strip	Bars Wire Structurals
301	37.50	30.50	28.50
302	37.50	33.00	28.50
303	39.50	36.50	31.00
304	39.50	35.00	30.00
309	52.00	52.00	41.50
316	53.00	55.00	46.00
321	45.50	44.50	34.00
347	50.00	48.50	38.50
410	33.00	27.00	23.00
416	33.50	33.50	23.50
420	40.50	43.50	28.50
430	35.50	27.50	23.50
501	24.00	22.50	11.50
502	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2.

Baltimore, bars, wire and structurals A10.

Brackenridge,Pa., sheets A4

Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.

Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18.

Cleveland, strip, except Type 309 quoted 51.00c, and except Type 416 A7.

Detroit, strip, except Type 309 M1.

Dunkirk, N.Y., bars, wire A4.

Duquesne, Pa., bars C3.

Gary, Ind., sheets except Type 416 C3.

Harrison, N. J., strip C18.

Massillon, all products, except Type 309 bars, wire & structurals quoted 42.00c. Type 501, 10.50c, Type 502 11.50c R2.

McKeesport, Pa., bars; sheets except Type 416, C3.

McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.

Middletown, O., sheets and strip, except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & strip C18.

Munhall, Pa., bars C3.

Pittsburgh, sheets C18.

Reading, Pa., bars & strip except Type 309 bars quoted 42.00c C4.

So. Chicago, Ind., bars & structurals C3.

Syracuse, N. Y., bars, wire & structurals C18

Titusville, Pa., bars U4.

Wallingford, Conn., strip, except 309, W2 quotes ¼-cent higher.

Washington, Pa., bars, sheets & strip except Type 309 strip quoted 51.00c J3.

Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 58.00c, strip 60.00c W4.

Watervliet, N. Y., structurals & bars A4.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, except Type 309 quoted 51.00c A4.

Youngstown, strip C8.

COAL, CHEMICALS

Spot, cents per gallon, ovens

Pure benzol	22.00
Toluol, one deg.	19.00-24.75
Industrial xylol	20.50-26.50

Per ton bulk, ovens

Sulphate of ammonia	$45.00

Per pound, ovens

Phenol, 40 (carlots, returnable drums)	13.25
Do., less than carlots	14.00
Do. tank cars	12.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.

Imported, net ton, duty paid, metallurgical grade, $39-$40.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh)

	Cents
Sponge Iron:	
98+% Fe, carlots	15.00
Swedish, c.i.f. New York, in bags	7.40-8.50
Electrolytic Iron:	
Annealed, 99.5% Fe	39.50
Unannealed, 99+% Fe	33.50
Unannealed, 99+% Fe (minus 325 mesh)	48.50
Carbonyl Iron: 97.9-99.8%, size 5 to 10 microns	65.00-130.00
Aluminum:	
Carlots, freight allowed	27.00
Atomized, 500-lb drums, freight allowed	30.00
Brass, 10-ton lots	23.25-26.25
Copper:	
Electrolytic	27.75
Reduced	27.00
Lead	18.50
Manganese:	
Minus 100-mesh	52.00-55.00
Minus 35 mesh	48.00
Minus 200 mesh	56.00
Nickel, unannealed	61.00-66.00
Silicon	34.00-40.00
Solder (plus cost of metal)	8.50
Stainless Steel, 302	75.00
Tin	90.00-90.75
Zinc, 10-ton lots	15.50-18.25

Dollars

Tungsten:	
99%, minus 80 to 200 mesh, freight allowed, 1000 lb and over	2.90
500 to 1000 lb	2.95
less than 500 lb	3.05
98.8%, minus 65 mesh, freight allowed, 1000 lb and over	2.90
less than 1000 lb	3.05
Molybdenum:	
99%, minus 80 to 200 mesh, over 500 lb	2.25
200 to 500 lb	2.50
less than 200 lb	2.75
82-88%, freight allowed, 2000 lb and over	2.40
less than 2000 lb	2.45
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price per Net Ton

BEEHIVE OVENS

Connellsvll.fur.	$13.00-13.50
Connellsvll.fdry.	15.00-16.00
New River, foundry	18.00
Wise county, foundry	15.35
Wise county, furnace	14.60

OVEN FOUNDRY COKE

Kearny, N. J., ovens	$22.00
Everett, Mass., ovens New England, del.‡	22.70
Chicago, ovens	21.00
Chicago, del.	†22.45
Detroit, del.	24.91
Terre Haute, ovens	21.20
Milwaukee, ovens	21.75
Indianapolis, ovens	19.85
Chicago, del.	23.32
Cincinnati, del.	22.77
Detroit, del.	23.75
Ironton, O., ovens	19.40
Cincinnati, del.	21.63
Painesville, O., ovens	20.90
Buffalo, del.	23.02
Cleveland, del.	22.62
Erie, del.	21.04
Birmingham, ovens	17.70
Philadelphia, ovens	20.45
Swedeland, Pa., ovens	20.40
Portsmouth, O., ovens	19.50
Detroit, ovens	20.65
Detroit, del.	*21.70
Buffalo, del.	22.95
Flint, del.	23.00
Pontiac, del.	21.98
Saginaw, del.	23.30

Includes representative switching charge of: *, $1.05; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.03 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		Bars			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R. 15 Ga.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
New York (city)	5.75	6.84	7.20	6.04	...	5.85	6.64	8.60	5.65	5.90	7.34
New York(c'try)	5.55	6.54	6.90	5.84	...	5.65	6.44	8.40	5.45	5.70	7.14
Boston (city) ..	5.93	6.68	7.44	5.98	...	5.80	6.78	9.07	5.75	6.08	7.28
Boston (c'try) .	5.73	6.48	7.24	5.78	...	5.60	6.58	8.87	5.55	5.88	7.08
Phila. (city) ..	6.45	6.60	6.95	5.90	...	5.75	6.46	8.40	5.50	5.70	6.80
Phila. (c'try) .	6.20	6.35	6.70	5.65	...	5.50	6.21	8.15	5.25	5.45	6.55
Balt. (city) ...	5.25	6.69	6.66	5.79	...	5.69	6.39	...	5.69	5.40	7.04
Balt. (c'try) ..	5.05	6.49	6.46	5.59	...	5.49	6.19	...	5.49	5.20	6.84
Norfolk, Va. ..	5.80‡	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
Wash. (w'hse).	6.07‡	...	...	6.00	...	5.90	6.62	...	5.90	6.10	7.47
Buffalo (del.)..	5.20	5.95	6.94	5.56	...	5.20	5.85	10.43††[5]	5.30	5.60	6.90
Buffalo (w'hse)	5.05	5.80	6.79	5.41	...	5.05	5.65	9.90††[5]	5.15	5.45	6.75
Pitts. (w'hse)..	5.05	5.80*	6.45-6.70	5.20	6.15	5.00	5.75	9.55††	5.05	5.15	6.40
Detroit (w'hse)	5.33	6.08*	7.09	5.49	...	5.39	6.03	9.86††[5]	5.44	5.59	6.68
Cleveland (del.)	5.25	6.00	7.15	5.44	6.20	5.32	5.95	8.31	5.37	5.52	6.87
Cleve. (w'hse).	5.05	5.80	6.95	5.24	6.00	5.12	5.75	8.16	5.17	5.32	6.67
Cincin. (w'hse).	5.32	5.84	6.29	5.49	...	5.39	6.10	9.90††[5]	5.44	5.59	6.75
Chicago (city)..	5.25	6.00*	6.90	5.30	...	5.20	5.85	9.75††[5]	5.25	5.40	6.60
Chicago (w'hse)	5.05	5.80*	6.70	5.10	...	5.00	5.65	9.55††[5]	5.05	5.20	6.40
Milwaukee(city)	5.39	6.14*	7.04	5.44	...	5.34	6.09	9.89††[5]	5.39	5.54	6.74
Milwau. (c'try).	5.19	5.94*	6.84	5.24	...	5.14	5.89	9.69††[5]	5.19	5.34	6.54
St. Louis(del.).	5.53	6.28	7.18	5.58	...	5.48	6.23	10.03††[5]	5.53	5.68	6.88
St. L. (w'hse).	5.38	6.13	7.03	5.43	...	5.33	6.08	9.88††[5]	5.38	5.53	6.73
Birm'ham (del.)	5.20[10]	5.95	6.30[3]	5.25[10]	...	5.15[10]	6.88	...	5.20[10]	5.35[10]	7.63[10]
Birm'hm(w'hse)	5.05[10]	5.80	6.15[3]	5.10[10]	...	5.00[10]	...	...	5.05[10]	5.20[10]	...
Omaha, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	5.95	7.15	7.60	6.00	8.25	5.95	7.70	...	5.85	5.95	8.15
L. A. (w'hse)..	5.80	7.00	7.45	5.85	8.10	5.80	7.55	...	5.70	5.80	8.00
San Francisco..	6.25[9]	8.60[3]	7.50[3]	6.75[9]	8.25[3]	6.15[9]	7.80[9]	...	6.00[9]	6.15[9]	8.10[9]
Seattle-Tacoma.	6.70[7]‡	8.15[3]	...	6.90	...	6.35	8.50	10.10	6.20	6.35[7]	8.40[7]
Kans. (w'hse)..	5.65	6.40	7.30	5.70	...	5.60	6.35	10.10	5.65	5.80	7.00

• Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); § as rolled; †† as annealed. Base quantities: 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 1000 lb and over; [1]—1500 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—300 to 499 lb; [9]—400 to 3999 lb; [10]—500 to 9999 lb inc.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., $107; Ottawa, Ill., $106. Hard-fired, $141 and $135, respectively at various points.

High-heat Duty: Salina, Pa. $91; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., Ottawa, Ill., $86.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $80.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., $72; Ottawa, Ill., $70.

LADLE BRICK

Dry Press: Freeport, Merill Station, Clearfield, Pa., Irondale, Wellsville, O., $60; Chester, New Cumberland, W. Va., $55.

Wire Cut: Chester, New Cumberland, W. Va., Wellsville, O., $58.

MALLEABLE BUNG BRICK

St. Louis, Mo., Olive Hill, Ky., $96; Ottawa, Ill., $90; Beach Creek, Pa., $86.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $86; Hays, Pa., $91; Joliet or Rockdale, Ill., E. Chicago, Ind., $95; Lehi, Utah, Los Angeles, $101.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $84.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $85.

BASIC BRICK

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; Chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅝" grains; Bulk, $30.50-$31; single paper bags, $35-$35.50.

DOLOMITE

(Base prices per net ton)

Domestic, dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibsonburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. Future increases in upper lake rail freight rates, dock handling charges and taxes thereon are for buyer's account.

Old range bessemer	$8.10
Old range nonbessemer	7.95
Mesabi bessemer	7.85
Mesabi nonbessemer	7.70
High phosphorus	7.70

EASTERN LOCAL ORE

Cents per unit, del E. Pa.

Foundry and basic 56.62% concentrates contract	16.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hemitites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Wolframite, scheelite, net ton unit, duty paid	$20-$22

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid. 79.8c-81.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48%	2.8:1	$35.00
48%	3:1	37.50
48%	no ratio	28.50-29.00

South African Transvaal

44%	no ratio	$17.00-18.00
45%	no ratio	18.00-18.50
48%	no ratio	26.00-27.00
50%	no ratio	27.00-27.50

Brazilian

44%	2.5:1 lump	$32.00

Rhodesian

45%	no ratio	$20.00-21.00
48%	no ratio	28.00-29.00
48%	3:1 lump	37.50

Domestic—rail nearest seller

48%	3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, cl., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75%C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese, Electrolytic: Less than 250 lb, max., Si 1% max., C 0.20% max.). Carload 2" x D, packed 35.5c per lb of metal, ton lot 37c. less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolitic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn., Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

(*Please turn to page* 158)

Increases Metal Stockpiling Goals

Munitions Board raises planned cost by $556 million. Urges speed in accumulation to prevent curtailment in production. Tin prices decline further to 74.25c, New York

New York—Munitions Board in Washington urges that stockpiling of strategic materials proceed "as rapidly as possible" now while materials are generally available for purchase in large quantities. Unless the stockpiling program is able to take up a "sizable portion" of surpluses that appeared in some commodities in 1949, the Board says production of these commodities probably will decline. This would make their procurement for national defense purposes more difficult at a later date.

Planned cost of the government's national defense stockpiling program has been increased by $556 million. This is revealed in the Board's semiannual report to Congress. The boost resulted from revisions of stockpiling goals for 11 materials, plus the addition of two new materials, aluminum and asbestos, to the stockpiling list.

Goals were revised for metallurgical chromite, metallurgical manganese, tin, corundum, kyanite, rubber, abaca, sisal, talc, quebracho, and opium. These materials represent about 36 per cent of the total vaue of the stockpiling goal.

Net effect of the revisions and additions is to increase the planned cost from $3,217,000,000 estimated on June 30, 1949, to $3,773,000,000 at the end of the year.

Although the effect of the changes is an increase in costs, the Board says that some objectives "may be reduced or eliminated."

By June 30, 1950, about 54 per cent of the dollar value of materials called for in the present program will be on hand or under contract, the report says. Review of stockpiling objectives is continuing, with goals for items making up 93 per cent of the stockpile being scheduled for revision by next April.

"Changing world conditions resulting in new strategic concepts point to a substantial increase in the ultimate objectives of some materials," the Board says.

The upward revision in stockpiling goals is expected to be an important factor in combatting the effects of devaluation of currencies abroad. Andrew Fletcher, president, St. Joseph Lead Co., in a talk to employees at the firm's Josephtown, Pa., zinc plant said there is a dark cloud of currency devaluation on the nonferrous metal horizon which may result in the dumping in the United States of more lead and zinc than can be consumed or stockpiled. "The effect of the 30 to 40 per cent currency devaluation abroad is that foreign miners can earn just about as much profit with 12-cent lead as with 15-cents, or with 9.75-cent zinc instead of 12.50-cents," he said. "This difference in price under present U. S. costs of labor and materials may be the difference between a prosperous or a depressed domestic mining industry."

Zinc—In addition to the threat of large importations of foreign lead, the domestic mining industry is confronted with the possibility of increased taxes. Senator Pat McCarran (Dem., Nev.) says the mining industry must have further tax concessions if it is to continue in a period of falling prices.

The National Minerals Advisory Council recommended last December that the following changes in the tax structure as applied to mining must be made: Allowance for depletion should be made to the stockholder as well as to the corporation; tax exemption should be granted to a mine for a period of at last three years after beginning of profitable operations; development of costs after discovery should be recognized as operating expenses; adequate allowances for percentage depletion should be made; losses from unprofitable ventures should be allowed corporations, partnerships, or individuals as ordinary deduction against current income.

Although New Jersey Zinc Co.'s Palmerton plant has resumed operations following a strike, it will be several weeks before there can be a noticeable increase in zinc supplies. Special high grade zinc supplies remain tight while those of prime western are ample for current needs.

Lead—Sales of lead for January shipments exceeded those for December shipment by about 3500 tons. Bookings for February shipment have held at a satisfactory pace, sustaining prices on a firm basis. Offerings of foreign lead are being made at around 11.75c, ex-dock New York.

Copper—Up to late last week, negotiations were still under way for settlement of the strikes at the El Paso and Laurel Hill refineries. In view of the shrinkage in new supplies, consumers are ordering substantial tonnages for March delivery on the firm price basis of 18.50c, delivered Connecticut Valley, for electrolytic.

Tin—The tin market still seeks a level at which it can stabilize. The Reconstruction Finance Corp. lowered its price to 74.50c, New York, to bring it in closer competition with the open market where offerings were made at 74.25c. British, Dutch and Bolivian representatives are consulting with this government, principally on tonnages required for the strategic stockpile and the prices which will be paid. Stockpiling requirements are a major market factor since production is currently in excess of industrial requirements.

Antimony—National Lead Co. reduced the price of antimony 1½ cents a pound on Feb. 2 to the basis of 27.25c, f.o.b. Laredo, Tex., for bulk quantities. The former price of 28.75c had held since Jan. 13, 1950, when it was lowered 3¼ cents a pound.

STEEL's Metal Price Averages for Jan., 1950

(Cents per pound)

Electrolytic Copper, del. Conn.	18.500
Lead, St. Louis	11.800
Prime, Western Zinc, E. St. Louis	9.810
Straits Tin, New York	76.020
Primary Aluminum Ingots, del.	17.000
Antimony, f.o.b. Laredo, Tex.	29.920
Nickel, f.o.b. refinery	40.000
Silver, New York	73.250

Platinum Price Drops $3

New York—Price of platinum was reduced $3 an ounce on Feb. 1 by a leading refiner to the basis of $66 an ounce for bulk quantities and $69 for smaller retail lots. This is the first change in prices since June 13, 1949, when quotations were lowered $3 an ounce.

The latest downward revision in prices is said to be an adjustment in keeping with the present rate of demand and supply of the metal. Authorities in the platinum market noted that jewelry demand has fallen off, although inquiry for the metal for industrial use is holding up well.

To Develop Bauxite Deposits

WASHINGTON — United States aluminum stockpile will be boosted as the result of a new bauxite-mining project in Jamaica, British West Indies, the Economic Cooperation Administration says.

Under the terms of a contract which has been signed between ECA and the Reynolds Metals Co., Louisville, Ky., and its subsidiaries, Reynolds Jamaica Mines Ltd., and Reynolds Mining C rp., ECA has agreed to advance up to $5,963,000 in Marshall Plan funds and 1.8 million pounds sterling (about $5 million) from the ECA counterpart funds in Britain to promote the development of bauxite on the island of Jamaica. Under the ECA Act, five per cent of counterpart funds accumulating in participating countries as equivalents to ECA dollar grants goes into a special account which is credited to the United States for the purchase of deficiency materials and for the payment of administrative expenses in each country.

Funds advanced by ECA will be repaid by the company over a period of 20 years in the form of aluminum which will be added to the U. S. government's stockpile.

Thus far, the Reynolds Metals Co. has spent approximately $1 million to explore the possibilities of obtaining bauxite from deposits in land which it owns in the Parish of St. Ann, and contemplates the additional expenditure of $1 million from its own funds for the project.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 18.50c, Conn. Valley, Lake, 18.62½c, Conn. Valley.
Brass Ingot: 85-5-5-5 (No. 115) 16.75-18.25c; 88-10-2 (No. 215) 25.25c; 80-10-10 (No. 305) 21.75c; No. 1 yellow (No. 405) 14.25-16.00c.
Zinc: Prime western 9.75c, brass special 10.00c, intermediate 10.25c, East St. Louis; high grade 10.85c, delivered.
Lead: Common, 11.80c; chemical, 11.90c; corroding, 11.90c, St. Louis.
Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.
Secondary Aluminum: Piston alloys 16.50-17.00c; No. 12 foundry alloy (No. 2 grade) 16.25-16.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 18.00-18.25c; grade 2, 17.50-17.75c; grade 3, 16.00-16.25c; grade 4, 15.50-15.75c. Prices include freight at carload rate up to 75 cents per 100 lb.
Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.
Tin: Grade A, prompt delivery, 74.25c; February arrival, 74.12½c; March arrival, 74.00c; April arrival, 73.87½c. Chinese, 99% tin, prompt del., 71.00c.

RFC selling prices for prompt delivery, ex-dock New York or f.o.b. Texas City, Tex.: Grade A, 99.8% or higher (including Straits) 74.50c.
Antimony: American 99-99.8% and over but not meeting specifications below 27.25c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 27.75c; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99%: Chinese, 24.00c; English, Belgium, prompt, 25.00c, New York.
Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.
Mercury: Open market, spot, New York $71-$74 per 76-lb flask.
Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.
Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.
Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.
Gold: U. S. Treasury, $35 per ounce.
Silver: Open market, New York, 73.25c per oz.
Platinum: $66-$69 per ounce.
Palladium: $24 per troy ounce.
Iridium: $100-$110 per troy ounce.
Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; based on 18.50-cent copper.)

Sheet: Copper 32.18; yellow brass 28.69; commercial bronze, 95%, 32.10; 90%, 31.61; red brass, 85%, 30.60; 80%, 30.12; best quality, 29.58; nickel silver, 18%, 42.27; phosphor-bronze, grade A, 5% 50.90.
Rods: Copper, hot-rolled 28.03; cold-drawn 29.28; yellow brass free cutting, 23.19; commercial bronze, 95% 31.79; 90% 31.30; red brass 85% 30.29; 80% 29.81.
Seamless Tubing: Copper 32.22; yellow brass 31.70; commercial bronze 90% 34.27; red brass 85% 33.51; 80% 33.03.
Wire: Yellow brass 28.98; commercial bronze, 95% 32.39; 90% 31.90; red brass, 85% 30.89; 80% 30.41; best quality brass 29.87.
Copper Wire: Bare soft, f.o.b., eastern mills, 100,000 lb lots 22.55, l.c.l. 23.17, c.l. 22.67; weatherproof, f.o.b. eastern mills, 100,000 lb lots 24.85, l.c.l. 25.60, c.l. 25.10; magnet, delivered, c.l. 28.50, 15,000 lb or more 28.75, l.c.l. 29.25.

ALUMINUM

Sheets and Circles: 2s and 3s mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-24	36.8	33.4	39.5
0.008-0.0075	12-24	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	R317-T4	——Hexagonal—— 17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	36.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $17.00 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $17.00 per cwt. Traps and bends: List price plus 45%.

ZINC

Sheets, 15.50c f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 15.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.00c; over 12-in., 15.00c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled, 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.
Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 28.84cc; oval 28.34c; cast 26.87c.
Copper Cyanide: 70-71% Cu, 100-lb drums, 46.50c f.o.b. Niagara Falls, N. Y.
Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.
Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.75c; over 250 lb, 24.75c, f.o.b. Cleveland.
Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 100 lb, 64.00c; f.o.b. Cleveland.
Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbls, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.
Tin Anodes: Bar, 1000 lb and over 91.00c, 500 to 999 lb, 91.5c; 200 to 499 lb, 92.00c; less than 200 lb, 93.5c; ball, 1000 lb and over, 93.25c; 500 to 999 lb, 93.75c; 200 to 499 lb 94.25c; less than 200 lb, 95.75c f.o.b. Sewaren, N. J.
Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 58.2c; 100 or 300 lb drums only, 100 to 500 lb, 49.9c; 600 to 1900 lb, 47.6c; 2000 to 9900 lb, 45.8c, f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.
Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c, f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.
Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 84.50c; more than 2000 lb, 82.50c, f.o.b. Carteret, N. J.
Stannous Chloride (Anhydrous): In 400 lb bbl, 70.80c; 100 lb kegs 71.80c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	15.50	15.50	14.75
Yellow brass	12.50	12.25	11.37½
Commercial Bronze			
95%	14.50	14.25	13.75
90%	14.25	14.00	13.50
Red brass			
85%	14.00	13.75	13.25
80%	13.62½	13.37½	12.87½
Best Quality (71-80%)	13.37½	13.12½	12.62½
Muntz Metal	11.50	11.25	10.75
Nickel, silver, 10%	14.50	14.25	7.25
Phos. bronze, A	16.75	16.50	15.50
Naval brass	12.00	11.75	11.25
Manganese bronze	12.00	11.75	11.12½

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 15.50; No. 2 copper 14.50; light copper 13.50; composition red brass 12.75; radiators 10.25; heavy yellow brass 9.75.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.50; No. 2 copper 14.50; light copper 13.50; refinery brass (60% copper) per dry copper content 13.75.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 13.50-13.75, No. 2 12.50-12.75; light copper 11.50-11.75; No. 1 composition red brass 11.00-11.25; No. 1 composition turnings 10.25-10.50; mixed brass turnings 6.25-6.50; new brass clippings 10.50-11.00; No. 1 brass rod turnings 9.25-9.50; light brass 6.00-6.25; heavy yellow brass 7.25-7.50; new brass rod ends 9.75-10.00, auto radiators, unsweated 8.50-8.75; cocks and faucets, 8.50-8.75; brass pipe 9.00-9.25.
Lead: Heavy 9.25-9.50, battery plates 4.50; linotype and stereotype 10.00-10.25; electrotype 9.00-9.25; mixed babbitt 9.25-9.50.
Zinc: Old zinc 4.25-4.75; new die cast scrap 4.00-4.50; old die cast scrap 3.00-3.25.
Tin: No. 1 pewter 39.00-41.00; block tin pipe 60.00-62.00, No. 1 babbitt 30.00-30.50.
Aluminum: Clippings 2S 10.50-11.00; old sheets 7.50-8.00, crankcase 7.50-8.00, borings and turnings 3.00-3.50.

DAILY PRICE RECORD

1949	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Feb. 2	18.50	11.80	9.75	74.25	17.00	27.25	40.00	73.25
Feb. 1	18.50	11.80	9.75	74.25	17.00	28.75	40.00	73.25
Jan. Avg.	18.50	11.80	9.81	76.02	17.00	29.92	40.00	73.25
Jan. 30-31	18.50	11.80	9.75	74.25	17.00	28.75	40.00	73.25
Jan. 25-28	18.50	11.80	9.75	75.00	17.00	28.75	40.00	73.25
Jan. Avg.	18.50	11.80	9.81	76.08	17.00	29.92	40.00	73.25
Jan. 25-31	18.50	11.80	9.75	75.00	17.00	28.75	40.00	73.25
Jan. 23-24	18.50	11.80	9.75	75.25	17.00	28.75	40.00	73.25
Jan. 19-21	18.50	11.80	9.75	75.50	17.00	28.75	40.00	73.25
Jan. 17-18	18.50	11.80	9.75	76.00	17.00	28.75	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

UNIVERSITY OF MICHIGAN LIBRARIES

IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Feb. 2, 1950; gross tons except as noted. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Feb. 2	$27.33
Jan. 26	26.83
Jan. 1950	26.93
Feb. 1949	38.48
Feb. 1945	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	*$31.00-31.50*
No. 2 Heavy Melt.	24.00-28.00*
No. 1 Busheling	*31.00-31.50*
No. 1 Bundles	*31.00-31.50*
No. 2 Bundles	24.00-25.00*
No. 3 Bundles	23.00-24.00*
Heavy Turnings	26.00-27.00
Machine Shop Turnings	*21.50-22.00†*
Mixed Borings, Turnings	*21.50-22.00†*
Short Shovel Turnings	25.00-26.00
Cast Iron Borings	24.00-25.00
Low Phos. Steel	32.00-33.00*

Cast Iron Grades*

No. 1 Cupola Cast	33.50-34.00
No. 1 Machinery Cast	38.00-39.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast	27.00-28.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	*32.00-32.50*
Axles	*35.00-36.00*
Rails, Random Lengths	35.50-36.00
Rails, 2 ft. and under	39.00-40.00
Rails, 18 in. and under	40.00-41.00
Railroad Specialties	*34.00-35.00*
Angles, Splice Bars	32.00-33.50*

* Nominal.
† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	*$28.00-28.50*
No. 2 Heavy Melt. Steel	*25.50-26.00*
No. 1 Busheling	*28.00-28.50*
No. 1 Bundles	*28.00-28.50*
No. 2 Bundles	*22.00-22.50*
Machine Shop Turnings	*18.00-18.50*
Mixed Borings, Turnings	*21.00-21.50*
Short Shovel Turnings	*21.00-21.50*
Cast Iron Borings	*21.00-21.50*
Low Phos.	*29.00-29.50*
Cut Structurals	*31.00-31.50*

Cast Iron Grades

No. 1 Cupola	*40.00-40.50*
Charging Box Cast	36.50-37.50
Stove Plate	35.50-36.50
Heavy Breakable Cast	*31.00-31.50*
Unstripped Motor Blocks	31.00-32.00
Brake Shoes	28.50-29.50
Clean Auto Cast	*41.00-41.50*
No. 1 Wheels	35.50-36.00
Burnt Cast	31.50-32.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00-32.50
R.R. Malleable	38.50-39.00
Rails, 3 ft and under	*41.00-42.00*
Rails, 18 in. and under	43.00-44.00
Rails, Random Lengths	38.00-39.00
Cast Steel	34.00-35.00
Railroad Specialties	35.00-35.50
Uncut Tires	36.00-37.00
Angles, Splice Bars	*39.50-40.50*

VALLEY

No. 1 Heavy Melt. Steel	*$31.00-31.50*
No. 2 Heavy Melt. Steel	*29.00-30.00*
No. 1 Bundles	*31.00-31.50*
No. 2 Bundles	*24.50-25.50*
Machine Shop Turnings	*21.50-22.50*
Short Shovel Turnings	*23.50-24.00*
Cast Iron Borings	*23.50-24.00*
Low Phos.	*32.50-33.00*

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.50-33.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	*$23.00-23.50*
No. 2 Heavy Melt. Steel	21.00-21.50
No. 1 Busheling	21.00-21.50
No. 1 Bundles	*23.00-23.50*
No. 2 Bundles	18.00-19.00
Machine Shop Turnings	*15.50-16.50*
Short Shovel Turnings	*17.50-18.00*
Mixed Borings, Turnings	15.00-15.50
Bar Crop and Plate	25.50-26.00
Punchings & Plate Scrap	25.50-26.00
Cut Structurals	25.00-26.00
Elec. Furnace Bundles	*24.50-25.00*
Heavy Turnings	24.00
No. 1 Chemical Borings	29.00
Knuckles and couplers	*29.00*
Steel car wheels	*29.00*

Cast Iron Grades

No. 1 Cupola Cast	30.00-31.00
No. 1 Machinery Cast	36.00-37.00
Charging Box Cast	34.00
Heavy Breakable Cast	34.00
Unstripped Motor Blocks	25.00-26.00
Clean Auto Cast	36.00-37.00
No. 1 Wheels	37.00
Malleable	*38.00-39.00*

CINCINNATI

No. 1 Heavy Melt. Steel	$26.00
No. 2 Heavy Melt. Steel	23.00
No. 1 Busheling	26.00
No. 1 Bundles	26.00
No. 2 Bundles	20.00
Machine Shop Turnings	13.00
Short Shovel Turnings	16.00
Mixed Borings, Turnings	16.00
Cast Iron Borings	16.00

Cast Iron Grades

No. 1 Cupola Cast	38.00
Charging Box Cast	32.00
Heavy Breakable Cast	32.00
Stove Plate	30.00
Unstripped Motor Blocks	22.00
Brake Shoes	22.00
Clean Auto Cast	38.00
Drop Broken Cast	42.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	30.00
R.R. Malleable	30.00
Rails, Rerolling	34.00
Rails, Random Lengths	33.00
Rails, 18 in. and under	42.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$21.00-22.00
No. 1 Bundles	23.00-24.00
No. 2 Bundles	20.00-21.00
No. 1 Busheling	23.00-24.00
Machine Shop Turnings	12.00-13.00
Mixed Borings, Turnings	12.00-13.00
Short Shovel Turnings	14.00-15.00
Cast Iron Borings	16.00-17.00
Punchings & Plate Scrap	23.00-24.00

Cast Iron Grades

No. 1 Cupola Cast	33.00-34.00
Heavy Breakable Cast	29.00-30.00
Clean Auto Cast	35.00-36.00

BUFFALO

No. 1 Heavy Melt. Steel	$27.50-28.00
No. 2 Heavy Melt. Steel	25.50-26.00
No. 1 Bushelings	25.50-26.00
No. 1 Bundles	26.50-27.00
No. 2 Bundles	24.00-24.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	19.00-19.50
Cast Iron Borings	19.00-19.50
Short Shovelings	19.50-20.00
Low Phos.	29.00-29.50

Cast Iron Grades

No. 1 Machinery	*35.00-36.00*
No. 1 Cupola	*32.00-33.00*
Malleable	*31.00-32.00*

Railroad Scrap

Rails, 2 ft. and under	38.00-39.00
Scrap rails	35.00-35.50
Specialties	33.00-34.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point

No. 1 Heavy Melt. Steel	*$20.25-20.75*
No. 2 Heavy Melt. Steel	17.50-18.00
No. 1 Busheling	17.50-18.00
No. 1 Bundles	*20.25-20.75*
No. 2 Bundles	16.00
Machine Shop Turnings	10.50-11.00
Mixed Borings, Turnings	10.50-11.00
Short Shovel Turnings	10.50-11.00
Punchings & Plate Scrap	19.50-20.00
Cut Structurals	19.50-20.00
Elec. Furnace Bundles	19.50-20.00

Cast Iron Grades

No. 1 Cupola Cast	26.00-27.00
No. 1 Machinery	27.00-28.00
Charging Box Cast	26.00-27.00
Heavy Breakable	26.00-27.00
Unstripped Motor Blocks	20.00-21.00
Malleable	34.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$18.00-19.00
No. 2 Heavy Melt. Steel	*17.00*
No. 1 Bundles	18.00-19.00
No. 1 Busheling	*16.50-17.00*
Machine Shop Turnings	9.00-10.00
Mixed Borings, Turnings	9.00-9.50
Short Shovel Turnings	12.00-13.00
Bar Crops and Plate	20.00-21.00
Punchings & Plate Scrap	20.00-21.00
Chemical Borings	*19.00-19.50*

Cast Iron Grades

No. 1 Cupola Cast	29.50-32.50
Mixed Cast	23.00-24.00
Heavy Breakable Cast	26.50-27.50
Stove Plate	23.50-24.50
Unstripped Motor Blocks	19.50-20.50

CHICAGO

No. 1 Heavy Melt. Steel	$27.00-28.00
No. 2 Heavy Melt. Steel	25.50-26.50
No. 1 Bundles	27.00-28.00
No. 2 Bundles	22.00-23.00
Machine Shop Turnings	18.00-19.00
Mixed Borings, Turnings	18.00-19.00
Short Shovel Turnings	20.00-21.00
Cast Iron Borings	18.00-19.00
Low Phos.	30.50-31.50
Elec. Furnace Bundles	27.00-28.00
Heavy Turnings	23.00-24.00
Cut Structurals	29.00-30.00

Cast Iron Grades

No. 1 Cupola Cast	40.00-41.00
Clean Auto Cast	41.50-42.50
No. 1 Wheels	33.00-34.00
Stove Plate	31.00-32.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.50-29.50
Malleable	35.00-36.00
Rails, Rerolling	39.00-40.00
Rails, Random Lengths	32.00-33.00
Rails, 2 ft and under.	39.00-40.00
Rails, 18 in. and under	40.00-41.00
Railroad Specialties	30.00-31.00
Angles, Splice Bars	34.00-35.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	24.50
No. 1 Busheling	24.00
No. 2 Bundles	22.00
Machine Shop Turnings	15.00
Mixed Borings, Turnings	15.00
Short Shovel Turnings	19.00
Cast Iron Borings	18.00
Bar Crops and Plate	30.00
Cut Structurals	23.00

Cast Iron Grades

No. 1 Cupola Cast	34.00-35.00
Stove Plate	28.00-30.00
No. 1 Wheels	23.00-24.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.00
R.R. Malleable	nominal
Rails, Rerolling	37.00
Rails, 3 ft and under.	25.00-26.00
Angles and Splice Bars	31.00-33.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$28.00-29.00
No. 2 Heavy Melt. Steel	24.00-25.00
Machine Shop Turnings	14.00-15.00
Short Shovel Turnings	18.00-19.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00
Charging Box Cast	29.00-30.00
Heavy Breakable Cast	28.00-29.00
Brake Shoes	27.00-28.00
Clean Auto Cast	36.00-38.00
Burnt Cast	27.00-28.00

Railroad Scrap

R.R. Malleable	27.00-28.00
Rails, Rerolling	36.00-37.00
Rails, Random Lengths	32.00-33.00
Rails, 3 ft. and under	36.00-37.00
Uncut Tires	27.00-28.00
Angles, Splice Bars	32.00-33.00
Railroad Specialties	30.00-31.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-35.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Wheels	20.00
Rails, Random Lengths	20.00

SEATTLE

No. 1 Heavy Melt. Steel	$18.00
No. 2 Heavy Melt. Steel	18.00
No. 1 Busheling	15.50
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	13.00
Mixed Borings, Turnings	13.00
Punchings & Plate Scrap	22.00
Cut Structurals	22.00
Elec. Furnace Bundles	23.00

Cast Iron Grades

No. 1 Cupola Cast	27.50-30.00
Heavy Breakable Cast	20.00
Stove Plate	20.00
Unstripped Motor Blocks	18.00
Malleable	20.00
Brake Shoes	18.00
Clean Auto Cast	25.00
No. 1 Wheels	25.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	19.00
Railroad Malleable	25.00
Rails, Random Lengths	19.00
Angles and Splice Bars	19.00

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	*9.00*
Mixed Borings, Turnings	*9.00*
Punchings & Plate Scrap	24.00
Elec. Furnace Bundles	25.00

Cast Iron Grades

No. 1 Cupola Cast	27.00-29.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Rerolling	32.00

HAMILTON, ONT.

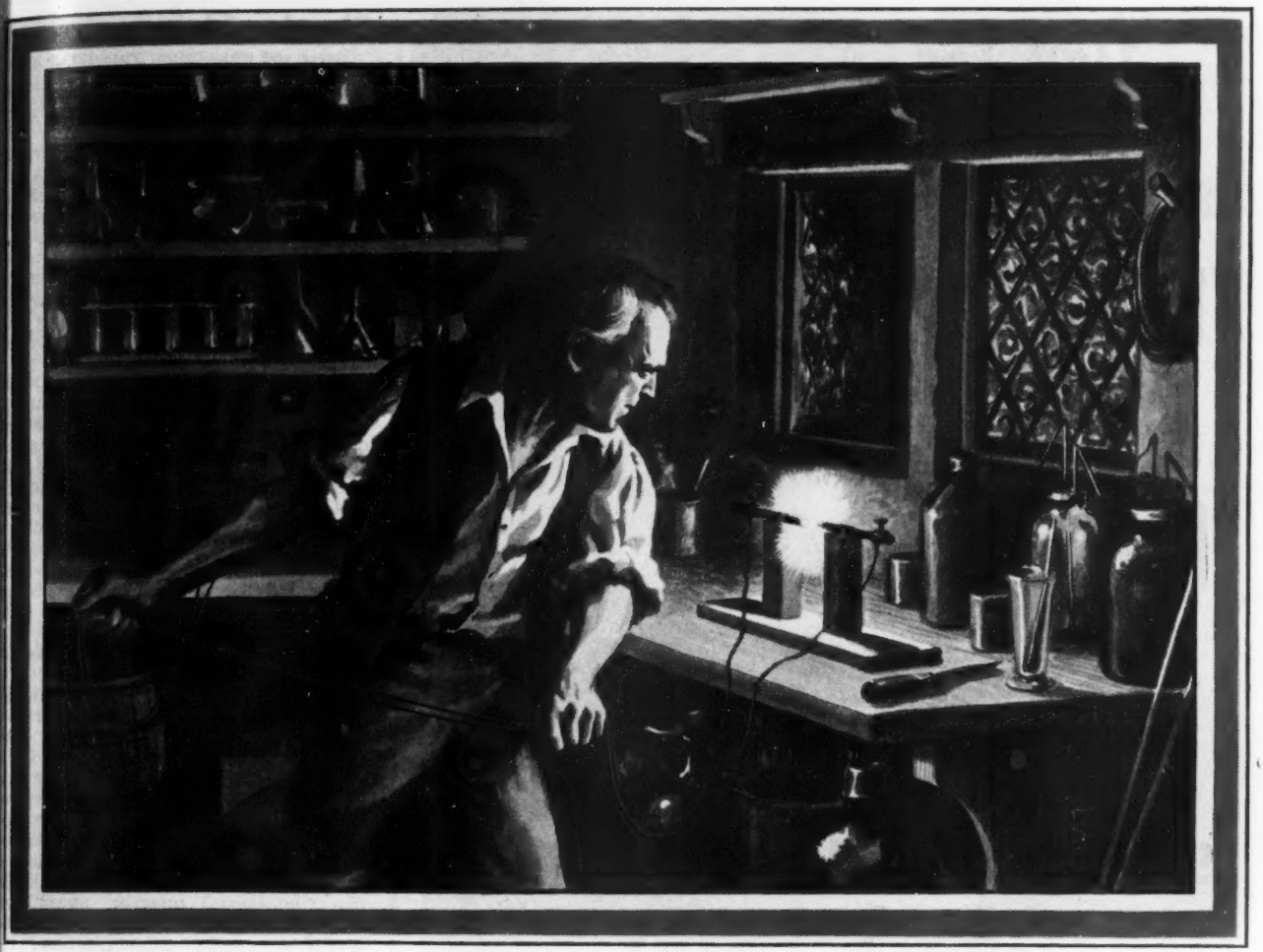
(Delivered prices)

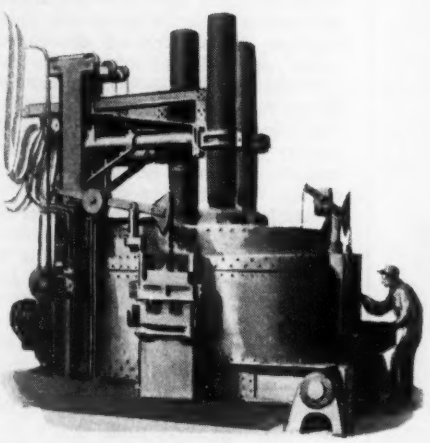
Heavy Melt.	$24.00
No. 1 Bundles	24.00
Mechanical Bundles	22.00
Mixed Steel Scrap	20.00
Mixed Borings, Turnings	18.00
Rails, Remelting	24.00
Rails, Rerolling	27.00
Busheling	18.00
Bushelings new factory, prep'd	22.00
Bushelings new factory, unprep'd	17.00
Short Steel Turnings	18.00

Cast Iron Grades

Cast	40.00-43.00*

* F.o.b. shipping point.





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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

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ENGINEERING B-W PRODUCTION

Sheets, Strip . . .

Sheet and Strip Prices, Page 137 & 138

Cleveland—Pressure for sheets and strip continues unabated. Producers are virtually sold out for first half on the major grades and are turning down third quarter tonnage. Automotive and home appliance makers' requirements are particularly heavy. The mills are allocating tonnage and strict adherence to customers' quotas will be continued so long as demand outstrips production. No noticeable easing in supply conditions is expected before mid-second quarter at earliest.

Consumers are ordering with an eye to holding down extra charges. Some customers have requested changes in their specifications since the new extra cards were issued, but such requests have not been numerous. The market is firm pricewise except for isolated adjustments which continue to be made by the separate sellers. Republic Steel Corp. on Jan. 31 announced a reduction of $5 per ton on field, armature and electrical grades of silicon sheets.

Boston—Although not sold so far in advance as standard items, pressure for flat-rolled specialties is heavy. Silicon sheet orders are on the books for June delivery. Enameling and galvanized stock is in strong demand. While orders for galvanized are heavy, definite scheduling beyond March or April is delayed by some producers. Substantial ratio of silicon being booked is strip in coils. Carbon strip bookings are for second quarter, except for infrequent openings in schedules. Analysis of recent price increases indicates consumers are absorbing costs in most cases and that nonintegrated producers of cold strip are squeezed hardest in matter of absorption of costs especially in low carbon grades.

Philadelphia — One midwestern sheet mill is expected to open books for second quarter momentarily on major grades. This is one of the few which has not already taken such action. Interest is still shown in the possible effects of the Chrysler strike on sheet schedules, with indication that there may be a loosening up in spots which will be reflected in the East, should the walkout continue much longer. To date, however, the strike has had no effect on requirements of a large sub-contractor here. Alan Wood Steel Co., Conshohocken, Pa., has put on a second turn at its new 30-inch strip mill.

Cincinnati—Strong sheet demand is bringing pressure for delivery positions in second quarter. District mills are all set to arrange schedules for the remainder of the half-year. Demand is broad, one feature being the renewed volume needs of sheets for household appliances. Mills consider the market "healthy." Stainless steel requirements are heavier.

Chicago—Monthly quotas for second quarter are awaited by consumers. There are no indications of any increase over the current period.

Supporting the opinion steel supply will remain tight on cold-rolled sheets throughout next quarter is forward conversion ordering. Automakers are currently discussing deals for May. Second quarter is wide open for hot-rolled conversion tonnage. Pressure

has heightened for prompt shipment to automakers probably as a hedge against a possible output loss because of the coal shortage.

St. Louis—Second quarter sheet allocations have been made. Quotas are the same as for first quarter, approximating 60 to 75 per cent of requested tonnage.

Los Angeles—Delivery dates are receiving greater emphasis as consumer pressure for sheets increases. There is little disposition to accumulate inventory, but fabricators' needs increased in January.

San Francisco—Supplies of galvanized sheets are tight, but strip and hot rolled sheets are gradually becoming more plentiful.

Atlantic Steel Revises Prices

Atlanta — Atlantic Steel Co., this city, has advanced net prices on nails and staples, under all columns effective Jan. 23. Increases in dollars per 100 lbs follow:

Common Nails: 2d, 0.30; 3d, 0.30; 4d, 0.20; 5d, 0.10

Finishing Nails: 3d, 0.45; 4d, 0.45; 6d, 0.35; 8d, 0.15; 10d, 0.15.

Casing Nails: 4d, 0.25; 6d, 0.25; 8d, 0.15; 10d, 0.15; 16d, 0.15.

Fine Nails: 3d, 0.20.

Egg Case Nails, cement coated, large flat head: 3d, 0.25.

Countersunk Nails, cement coated: 3d, 0.10; 4d, 0.10; 5d, 0.10.

Lath-Blued Sterilized: 2d, 0.40; 3d, 0.40; 3d light, 0.40.

Flooring Brads (standard): 8d, 0.15.

Flooring Brads (blunt point): 8d, 0.15.

Plaster Board Nails, smooth, blued, long diamond point, 19/64 in. diam. head: 1⅛ in. x 13, 0.40; 1¼ in. x 13, 0.40; ⅜ in. head: 1¼ in. x 12, 0.40.

Box Nails, cement coated: 3d, 0.20; 4d, 0.25; 6d, 0.20; 7d, 0.20; 8d, 0.20.

Poultry Netting Staples, galvanized: ¾ in. x 14 gage, 0.30.

Wire . . .

Wire Prices, Page 139

Cleveland—Order backlogs in most wire products will support high-level operations well into second quarter. Farm requirements are expanding, being stimulated by the open winter in many sections of the country. Further gains are expected next month when usual spring farm activities get under way. Nails are in noticeably tight supply. Fencing and barbed wire also are reported heavily booked up.

Huntington, W. Va.—West Virginia Steel & Mfg. Co. has advanced fence posts $4 per ton to column 116.

Boston — Preformed staple and bookbinders' wire have advanced $20 a ton; box stay wire, $15. New size extras also apply to latter two grades.

Pittsburgh—Sellers' order backlogs extend two to three months on merchant and manufacturers' wire items. An unusually heavy demand for nails and fence is noted for this season, due to mild weather in many areas. Some producers have increased operating schedules to meet demand for low carbon bright wire. Automotive requirements are particularly well sustained.

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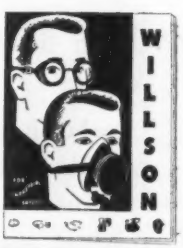

NEW CATALOG

In addition to product information, it contains information on safety glass, filter glass, respiratory hazards, etc., which will help you select proper safety equipment to meet specific hazards. Send for it!

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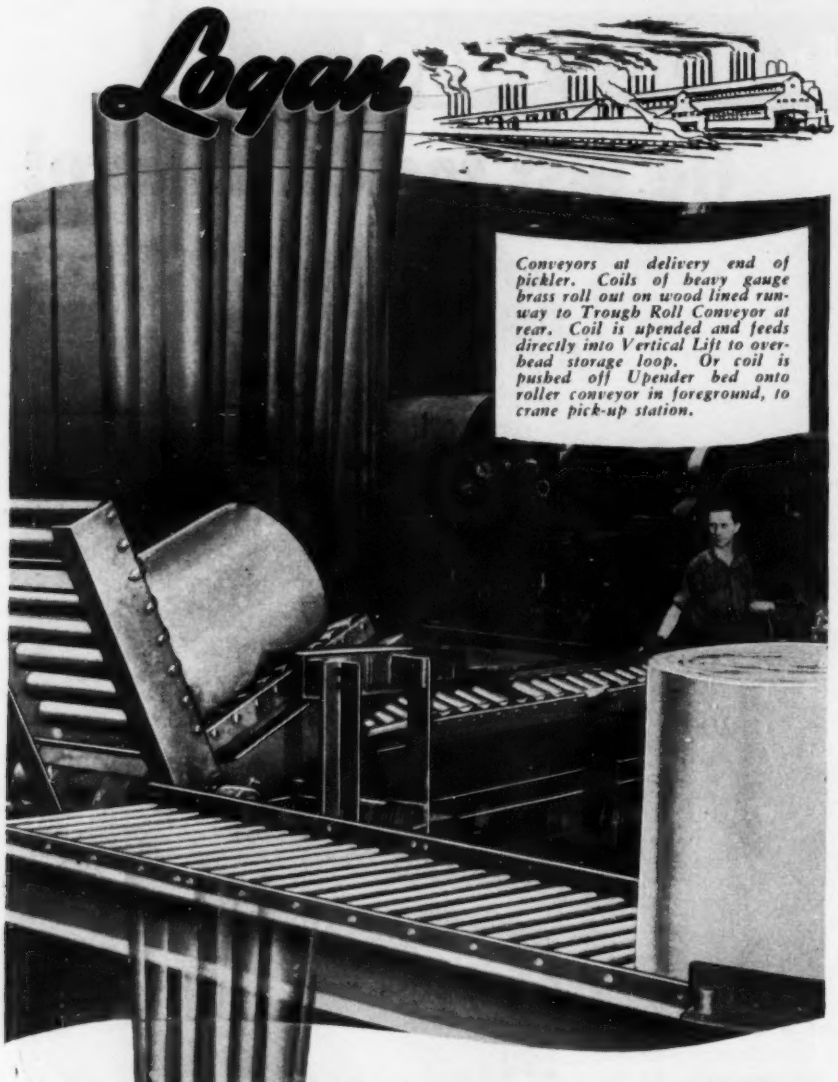
Logan
Conveyors at delivery end of pickler. Coils of heavy gauge brass roll out on wood lined runway to Trough Roll Conveyor at rear. Coil is upended and feeds directly into Vertical Lift to overhead storage loop. Or coil is pushed off Upender bed onto roller conveyor in foreground, to crane pick-up station.

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Logan Conveyors

LOGAN CO., INC., 535 CABEL ST., LOUISVILLE, KY.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 137

Seattle—Rolling mills are on reduced schedules. Severe weather has interrupted schedules and restricted deliveries. Estimators are busy as considerable work is up for bids.

Steel Bars . . .

Bar Prices, Page 137

Pittsburgh—Merchant carbon bar deliveries are extended 4 to 6 weeks. Alloy classifications are available in regular processing period, with exception of spring flats which, in most instances, are booked ahead 4 to 6 weeks. Sellers report no hold-up of shipments to date resulting from the Chrysler strike. Some improvement in demand is noted from cold finishers, although these interests report prompt shipments still are available on cold-drawn bars. Consumers find little leeway in avoiding higher bar extra schedules, although in some instances manganese specifications have been lowered to fall within the base range of 0.40 to 0.60 per cent.

Philadelphia—A fairly comfortable position exists for both producers and consumers of hot carbon bars. Most sellers have backlogs of four to six weeks, although one large eastern producer is virtually sold out for the quarter. Buyers have fair stocks and, hence, in most instances feel no need for the placing of new orders for earlier shipments. Actually, the flow of business has been steady and diversified. Cold-finished carbon bars can be had within two to three weeks, except in the specialties, where deliveries run eight weeks and beyond.

Boston—Increase of $5 per ton on cold-finished alloy bars is now general with base 5.20c f.o.b. Worcester and other New England producing points. Demand for alloy stock, while not heavy, is steady. More producers are absorbing freight on stainless. In the carbon range, smaller rod sizes are more extended. Deliveries are in May with most mills; larger sizes can be shipped in four to five weeks. Consumer inventories are usually in good balance.

New York—Hot carbon bars are in steady demand, deliveries averaging around four to six weeks. Consumers, by shopping around, can do even better on some sizes. Inquiry is diversified. Cold-drawn carbon bar shipment promises show little change around four to five weeks; hot and cold alloy bars, four to six weeks. In some instances, especially hot carbon bars, producers are booked ahead eight and nine weeks.

Cleveland—Merchant bar order backlogs are substantial but sellers still are booking business for late first quarter shipment. Pressure for bars is not comparable with that for sheets and strip. Hot carbon bar shipment promises range up to six weeks on the more popular sizes. Cold-drawn shipments are available in four to five weeks and alloy bars in less than five weeks. Prices are firm at the recently established higher levels but conflict in the new extra cards on bars and rods may result in early revision with respect to certain sizes.

Plates . . .

Plate Prices, Page 137

Philadelphia—District plate mills report little improvement in demand, and much of such business as is coming out is for early shipment. "They all seem to want it yesterday," one producer asserted. This pressure for nearby delivery is ascribed in part to the fact that one leading producer is now booked up until around the middle of March and that another, with extensive connections in the Midwest where plate demand is more active than along the Seaboard, is booked up at least that far ahead, if not a little further. This not only increases the pressure on local district mills for quick shipment, but provides a certain tonnage that they would not otherwise get. However, these latter mills still report volume as far from satisfactory, with most able to make shipments within three weeks.

Each one of three district plate mills took off an open hearth last week, as raw steel accumulations were becoming more than adequate. Lukens Steel Co. was one and this was not surprising, because, as noted in a previous issue, it had closed down its 204-inch mill last month for electrification, and a reduction in ingot requirements was expected. It has taken off three since the suspension of operations at this mill.

Boston—Most plate fabricators have workable inventories to cover current operations and are doing only light and spotty buying. Most carbon plate sizes can be delivered in three weeks, less when trucks are utilized from eastern Pennsylvania. Large diameter pipe requirements are heavier than usual, but small tank volume is off. Except for weldments, bulk of plate buying is confined to lighter gages.

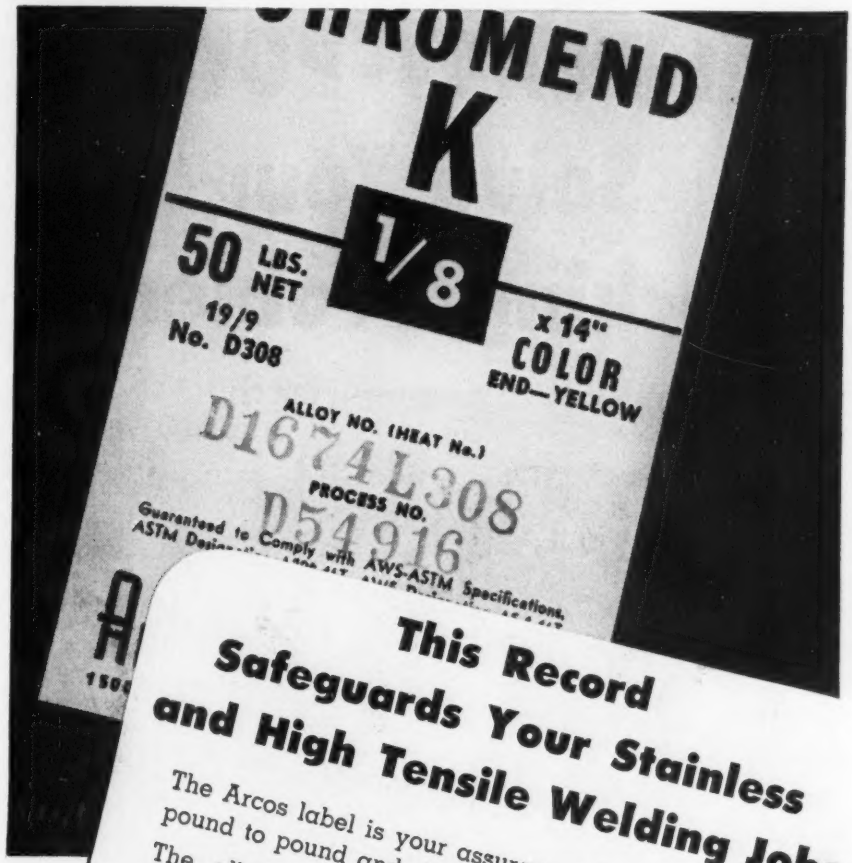
New York—Plate requirements continue restricted, making it difficult for producers to maintain schedules. Most eastern mills quote three weeks shipment; even better in some instances. Improvement is reported in oil and gas requirements, but heavy lines lag generally.

Chicago—More concern over price competition than supply is expressed by plate fabricators. Upward revision of plate prices is not being passed on to consumers in bidding on new projects, trend of bid prices, instead, being down.

Of considerable concern is slowness of oil refinery plate fabrication business. Fabricators say oil companies traditionally wait until the last minute before seeking bids. When appropriations are made, fabricators expect substantial new construction from this direction.

Freight car building and repair work holds the key to long-range plate demand. Sellers are hopeful the drought of new car ordering will end through a program now being discussed. This involves purchase of cars by financial institutions, and their lease to the railroads.

Seattle—Several sizable projects involving plates are up for early action. Shop operations in this area are at low ebb, but indications are promising. Weather conditions have adversely affected the industry.



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Tubular Goods . . .

Tubular Goods Prices, Page 140

Los Angeles — Demand for pipe, drilling rigs, and other oil field equipment continues slow, with domestic producers buying largely for replacement needs. Principal sustaining factor is export requirements, with a fair amount of business coming from oil companies in Venezuela and Argentina.

Seattle—Inquiry for cast iron pipe is slow, but more favorable weather is expected to stimulate demand.

Structural Shapes . . .

Structural Shape Prices, Page 137

Boston—Including 2250 tons, store addition, Boston, inquiry for fabricated structural steel approximates 5000 tons. Relatively large volume of welded work is included, also open steel grid flooring. Large bridge program by Massachusetts will be sustained by an elevated arterial highway, Boston, for which first contracts will be out for estimates next month.

New York—Structural inquiry is accumulating. Most fabricators anticipate noticeable improvement in contracts by late February or early March. They are optimistic on the outlook for first half. At the moment, business is spotty and fabricators' backlogs are shrinking.

Philadelphia—On the basis of normal comparisons, public works continue to lead the structural parade in this district. Power plants and miscellaneous utility work is fairly active, but in general industrial work lags. There is little office building construction and, while apartment house plans are fairly numerous, much is being held up because costs exceed budgets.

Sluggishness in private work is being generally felt by fabricators, some of which are now going after different types of work than they usually go in for, including public work. Prices on fabricated material, rather than reflect the recent increases in mill prices, are actually lower than they have been in a long time.

Cleveland — Competition is keen among structural fabricators for the small jobs currently before the trade. This being the off-season for building, demand for structurals is slow. However, substantial building activity is in prospect beginning in the spring, especially with respect to public projects. Meanwhile, shape supply is described as ample though wide flange sections continue tight.

Los Angeles — Fabricators report substantial increase in inquiries, especially in channels and light structural items. Building authorities consider the outlook for 1950 increasingly favorable.

San Francisco—Demand for structural shapes lags. Stocks of most items are ample, in some cases excessive. Pickup in building is unlikely before March.

Seattle—Fabricating operations are slow, weather interfering. Backlogs are not impressive, but figures are out on a number of sizable jobs scheduled for early action.

Tin Plate . . .

Tin Plate Prices, Page 138

Pittsburgh—No let-up in tin plate requirements is indicated throughout first half. Producers are experiencing little difficulty in selling secondary products and, in most instances, are booked through second quarter. Length extras for holloware enameling black plate have been revised. For base lengths of over 42 to 48 inches and over 48 inches to 60 inches, extras of $1 and $2 per ton, respectively, are charged. The unbalanced tin plate demand-supply outlook has prompted Bethlehem Steel Co. to expand facilities at Sparrows Point, while Weirton Steel Co.'s expansion program includes an additional electrolytic line.

Semifinished Steel . . .

Semifinished Prices, Page 137

Pittsburgh—Growing tightness in steel supply has prompted additional metalworking companies, chiefly automotive and electrical appliance concerns, to seek supplementary tonnage through conversion arrangements. Extent of price spread for this type tonnage is not divulged. Wire rod supply is more critical due to improved operations among nonintegrated wire producers and slight improvement in activity of nut and bolt interests. Growing shortage of tube rounds is noted. Skelp buyers have been forced to revise former order pattern to avoid new order quantity extras for under 200 net tons which range up to $5 per ton.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 140

Chicago—Foundry coke prices are up $1 a ton, effective Feb. 6 for most nearby producers. The Chicago producer, who raised its oven price to $21 on Feb. 1, quotes an arbitrary Chicago delivered price of $22.25. Average switching charge for other producers makes their Chicago delivered price $22.45. Terre Haute oven price is now $21.20. Milwaukee oven price is $21.75.

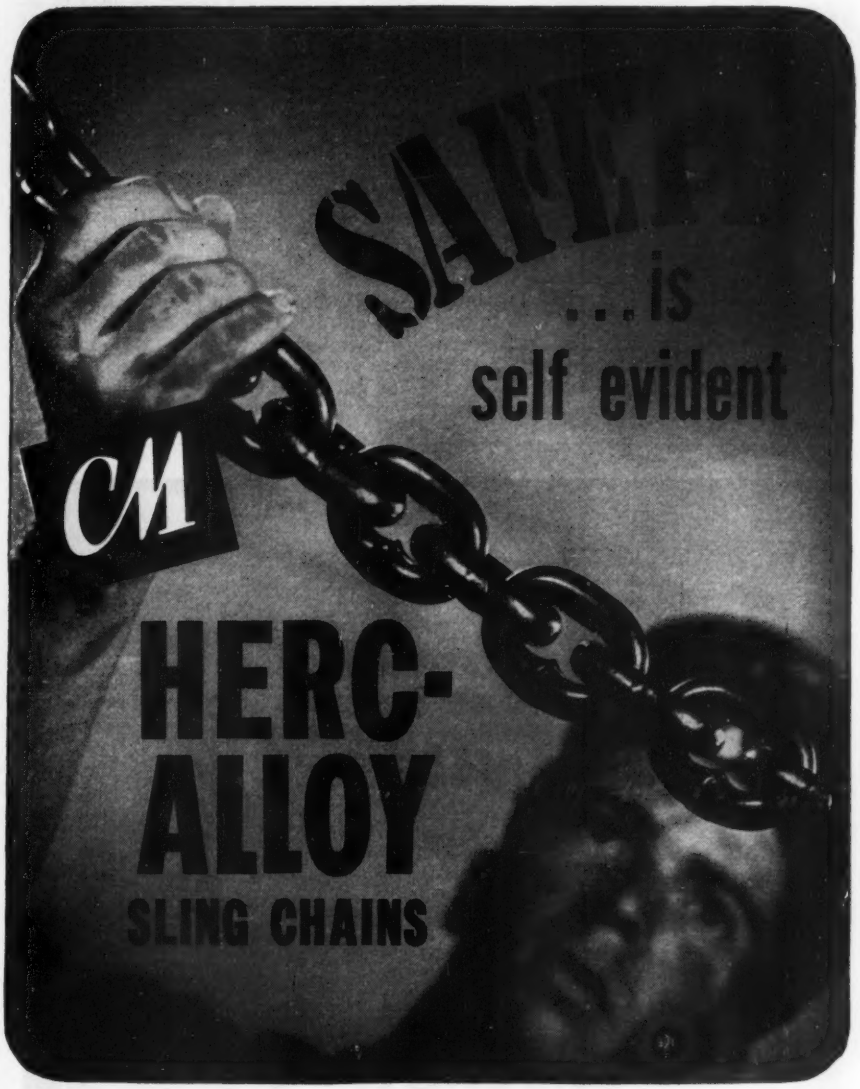
Pittsburgh — Foundry coke supply remains adequate due to depressed activity among jobbing foundries.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 140

Cleveland—Industrial fasteners demand is exceeding trade expectations. Bolt and nut producers are doing larger volume business than had been anticipated for this period, and rivet makers report encouraging improvement in demand from important consuming lines that in recent months have been ordering only lightly.

Price increases in January did not create much buying resistance. Boltmakers could increase production above current levels if steel supply would permit. Supply difficulties are being encountered, especially with respect to quality. One important bolt and nut producer has been compelled to reject considerable off-quality steel since the end of the strike last November.



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Warehouse . . .

Warehouse Prices, Page 141

Cleveland—Further slight improvement in demand is reported by local steel distributors but volume still is disappointing. Open weather throughout this area has stimulated repair work on a larger than normal seasonal scale, however, and this has brought out demand which might otherwise have been deferred until spring. Warehouse stocks, in most product categories, now are in good shape.

Philadelphia—Distributors look for business this month to be well sustained on a daily basis. Last month, activity was better than in December. Some distributors report a gain of at least 10 per cent. Due to the $1 mill extra put into effect on C1018 cold-drawn bars, warehousemen are switching to C1020 as base.

Boston—Except for flat-rolled products, warehouse inventories are in better balance with demand, which, for heavier carbon products, is down slightly. Sheet orders, notably galvanized, are heavy and in excess of supply.

Pittsburgh—Distributors' shipments from stock last month recorded moderate improvement over December volume and there is good prospect of further improvement this month. Warehouse stocks are ample, excluding galvanized and cold-rolled sheets, wide flange beams and pipe items.

Los Angeles—Activity of distributors has perked up noticeably, with demand firmer in sheet and bar categories. Prices are stabilized with warehouses posting increases in most items. Hot-rolled sheet is up 60 cents; hot-rolled strip, up 15 cents; cold-rolled strip, up 50 cents; hot-rolled rounds, up 45 cents; carbon plates, up 55 cents. Warehouses have added three additional base quantities to those already used for hot-rolled products.

San Francisco—Distributors' business is dull. Galvanized sheets are in heavy demand, but remain scarce. Cold-rolled sheets also are in short supply.

Seattle—Wholesalers have had a poor month, outdoor construction having been affected by extreme winter weather and heavy snow. Small shops have laid off forces.

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Refractories . . .

Refractories Prices, Page 141

Pittsburgh—Some ladle brick interests have advanced prices $5 per 1000 brick for dry press and wire cut quality. New price level is $60 for dry press and $58 per 1000 for wire cut.

Pig Iron . . .

Pig Iron Prices, Page 136

Buffalo—Improvement is noted in demand for merchant iron but two blast furnaces are idle because of the coke pinch. Pig iron operations are down to 81 per cent of capacity.

While demand for merchant iron increased, falling off is reported in movement of metal to Michigan foundries affected by the Chrysler strike. Offsetting the motor picture is a pickup in shipments to heating manufacturers.

The Donner-Hanna Coke Corp., which supplies Hanna Furnace and Republic Steel with coke, cut operations 20 per cent.

Boston—Pig iron shipping orders are up slightly, but until foundry melt steps higher no material improvement in pig iron releases is expected. Despite low melt, some shops operating off inventories are forced to take in more tonnage. Buying, however, is close to requirements with few consumers showing a disposition to build inventory. Currently, shipments are around two to one malleable compared with No. 2 foundry.

Philadelphia—Although the strike in the AFL foundries in the immediate area has entered its fourth week, pig iron sellers report a fair volume of business, improved specifications coming in from the outside to help bolster business. One leading seller reported better buying in January than had prevailed at any time during the preceding two months.

Pittsburgh—Slight improvement in foundry activity is developing. Merchant pig iron supply is adequate to meet current needs. However, the leading producer is shipping its entire output and the supply situation could easily become a retarding production factor should a slight upturn in foundry activity gain momentum.

Cleveland—Foundry pig iron melt is improving. Merchant iron is mov-

ing a little faster on old contracts but no spurt in buying has developed. Most foundries are covered fairly well ahead and are ordering only against definite requirements. Threatened curtailment of pig iron production because of coal shortage has not yet brought out any noticeable protective buying. Last week the coal supply outlook was reported slightly better.

Cincinnati—Merchant pig iron demand is sluggish. Melt is slightly improved, but foundries will not stock iron, even in face of possible furnace curtailments, so long as a coke shortage is threatened.

St. Louis—Demand remains high, especially from farm equipment lines. New pressure from local producers' southern selling territory is expected from a reported $3 price hike on Daingerfield (Tex.) iron.

Scrap . . .

Scrap Prices, Page 144

Pittsburgh—Small lot purchases of No. 1 open-hearth grades of scrap within the range of $31-$31.50 represent an advance of $1.50 a ton. Secondary steelmaking grades are nominally unchanged. Increased activity is noted in turnings to offset stringency in coal supply. Consumption of cast scrap remains somewhat depressed, despite threatened curtailment in pig iron output. Stronger price tone also is noted among recent railroad list awards, with railroad heavy melting selling within a range of $32 to $32.50 and specialties at a top of $35. Flow of scrap to consumers' yards is well maintained and mills' inventories are ample in most instances.

Philadelphia—Prices on steel scrap are a bit stiffer but on cast grades a trifle easier, thus reversing the situation that prevailed earlier in the year. No. 1 heavy melting steel and No. 1 bundles are higher at $23-$23.50, delivered, and machine shop turnings are higher at $15.50-$16.50 and short shovel turnings at $17.50-$18. Electric furnace bundles are easier at $24.50-$25. Railroad specialties are easier with knuckles and couplers and steel car wheels $29.00.

In general, steel grades reflect a stronger undertone. Except for malleable which is now lower at $38.00-$39.00, the principal cast grades are unchanged. There is a softer tone and anything like substantial buying in any of several leading grades appears likely to draw concessions.

Cleveland—A stronger undertone developed in the scrap market late last week, despite continuation of only small-scale buying. Based on sales made outside the district and scattered orders here, prices advanced $1 a ton on steelmaking grades and $1 to $1.50 a ton on turnings, low phos and cut structurals. Cast iron grades were generally unchanged, although No. 1 cupola cast eased to $40-$40.50; heavy breakable cast, to $31-$31.50; clean auto cast, to $41-$41.50.

Detroit—Bidding on automotive lists shows little life, with prices perhaps 50 to 75 cents a ton higher. However, this quickly subsided and the current market is unchanged.

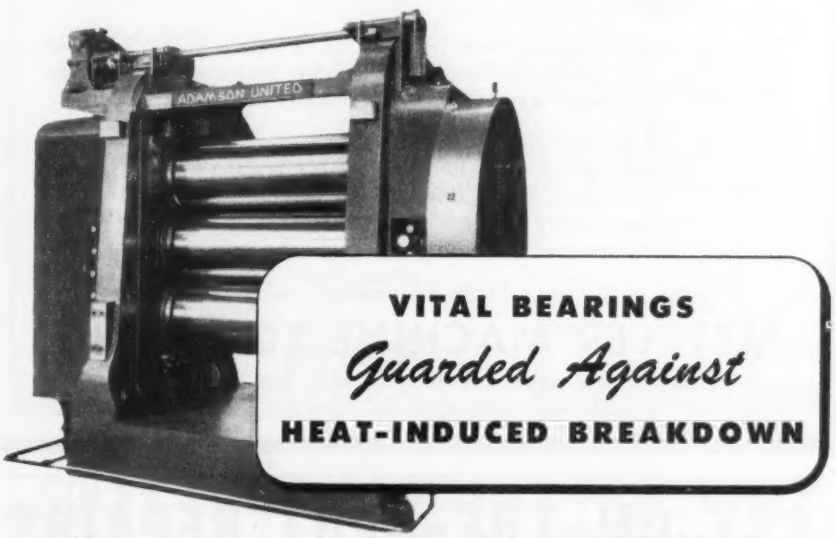
Buffalo—Activity in steelmaking grades is confined to dealer shipments on old orders but the cast market has tumbled about $1 a ton on sales totaling approximately 2000 tons. This carried cupola to $32-33. Light offerings of No. 1 machinery ranged from $35-36.

Dealers report the market is showing resistance to further price declines with a limited sale of extra quality No. 1 heavy melting at 50 cents to $1 higher than the prevailing range on regular No. 1.

Chicago—Prices marked time last week, but were under pressure from dealers for a higher level. Collection has slowed somewhat because of present price levels and some curtailment in generation, but brokers who advanced their buying prices more than the recent general increase quickly moved back into line. One mill has set its February buying price at the unchanged level of $28 for industrial No. 1 heavy melting and retains the $28 on track price of No. 1 material railroad.

New York—Scrap brokers have advanced buying prices on No. 1 heavy melting steel and No. 1 bundles to $20.25-$20.75, f.o.b. shipping point, as a result of a better movement into the Pittsburgh district.

Boston—Heavy melting steel scrap buying is sluggish with prices barely steady. Best offer for No. 2 is $17, shipping point, but $19-$19.50 for No. 1 heavy melting is not tested. Heavy busheling is slightly easier. Lighter



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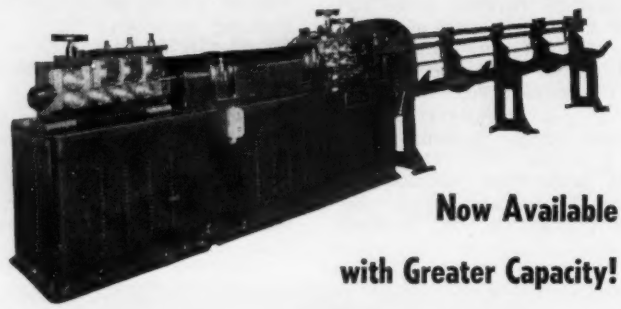

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grades of steel scrap are generally unchanged.

St. Louis—Absence of new orders leaves scrap prices unchanged. Filling of most outstanding orders is completed and large consumers are expected to "look around" for a period before placing new ones.

Los Angeles—Scrap demand lags with Kaiser out of the market for the present, and Bethlehem and Columbia buying only small tonnages.

Seattle — January's movement of steel scrap has been below normal. Back orders have been shipped. Weather conditions have handicapped yard operations. Bethlehem Pacific Coast Steel Corp., Seattle, will be back in the market next month for steel scrap.

San Francisco—Mill demand for scrap is sluggish and dealers are heavily loaded. Prices show no change.

Canada . . .

Toronto, Ont.—Canadian producers have revised base prices on hot rolled sheets, plate and steel bars, and at the same time adopted new extras in effect in the United States. Hot-rolled sheets are reduced from 3.85c base to 3.65c and steel plates from 3.95c to 3.85c per pound, while steel bars are advanced from 3.50c to 3.75c f.o.b. Hamilton.

No change is made in base price for cold-rolled strip, but U. S. extras now apply. Galvanized sheets also are unchanged, but a price revision is under consideration. Extras on galvanized sheets also have been revised in line with U. S. changes.

While it appears on surface there has been a reduction in the price of hot-rolled sheets and plate, actually by adopting the U. S. extras the cost of most items will be higher.

According to local steel interests, the new prices will have a tendency to turn a larger volume of business to British steel producers who already have booked large tonnage orders for delivery this year. While previously it was thought British steel would replace a substantial tonnage of U. S. materials flowing into this market, now it is believed imports from Britain may cut into domestic produced lines in that devalued pound sterling will give a big edge to the British.

Import controls on steel are expected to be abandoned and blanket permits will be issued to Canadian importers.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2400 tons, Country Club Center apartments, Philadelphia, to American Bridge Co., Pittsburgh.

700 tons, lower leaves McNary dam navigation lock, to Willamette Iron & Steel Co., Portland, Oreg.

650 tons, renovation of White House, Washington, to Bethlehem Steel Co.

600 tons, state bridges, Reading-Woburn, Mass., to American Bridge Co., Pittsburgh; Lane Construction Co., Meriden, Conn., general contractor.

600 tons, bascule bridge, McNary dam, to Willamette Iron & Steel Co., Portland, Oreg.

500 tons, Ferry street state bridge, Eugene, Oreg., to Poole, McGonigle & Dick, Portland, Oreg.

300 tons, state bridge, Northampton county,

Pennsylvania, to Bethlehem Steel Co.

250 tons, Newberry store building, Spokane, Wash., to Union Iron Works, Spokane.

200 tons, miscellaneous small jobs, Portland, Oreg., and vicinity, to Gunderson Bros. Engineering Corp., Portland, Oreg.

150 tons, conveyors for National Biscuit Co., Portland, Oreg., and boiler house, University of Oregon, Eugene, to Gunderson Bros. Engineering Corp., Portland.

150 tons, conveyor system, University of Oregon, Eugene, to Gunderson Bros. Engineering Corp., Portland.

150 tons, gates and stop logs, Bureau of Reclamation project, in Arizona, to Gunderson Bros. Engineering Corp., Portland, Oreg.

140 tons, two railroad bridges East low canal, Columbia Basin project, to American Bridge Co., Portland, low $25,343 f.o.b. Gary, Ind.

140 tons, Children's Aid Society building, New York, to Grand Iron Works, that city.

120 tons, addition, building No. 40, Armstrong Cork Co., Lancaster, Pa., to A. B. Rote Co., that city.

100 tons, state bridge, Berks county, to Bethlehem Steel Co., Bethlehem.

STRUCTURAL STEEL PENDING

2250 tons, store addition, Jordan-Marsh Co., Boston; George H. Fuller Co., Boston, low on general contract.

1800 tons, three state bridges Lookout Point dam, Oregon; American Bridge Co., Portland, low $431,183.

1400 tons, apartment, Baltimore Contractors Inc., Baltimore; bids closing.

1050 tons, state bridge, Lexington-Waltham, Mass.; bids in.

500 tons, Spingarn high school, Washington; Kramer-Volmerhausen, that city, low on general contract.

450 tons, FA-BRP 50-2, Bronx, New York; general contract to the Horn Construction Co., that city.

400 tons, Metaline Falls Washington state bridge, bids to Olympia Feb. 14.

300 tons, boiler house and power plant, veterans hospital, Lexington, Ky.; bids Feb. 10.

230 tons, telephone building addition, 193 Manhattan Ave., New York; Bethlehem Steel Co., low bidder.

200 tons, three state bridges, Sutton, Uxbridge-Douglas, Mass.; bids Feb. 7, department of public works, Boston.

200 tons, warehouse addition, Edgcomb Steel Co., Philadelphia; bids closed Feb. 3.

163 tons, state bridge, Lycoming and Columbia counties; bids Feb. 17.

140 tons, bridge, Pennsylvania Railroad, Broadacre, O.; bids Feb. 8.

130 tons, state bridge, Lexington, Mass.; bids in.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2600 tons, Sullivan square, reconstruction, Boston, to Truscon Steel Co., Boston; M. DeMatteo Construction Co., Quincy, Mass., general contractor.

125 tons, Lawton grade school, Seattle, to Bethlehem Pacific Coast Steel Corp., Seattle.

REINFORCING BARS PENDING

1200 tons, (previously reported unstated) 14-story Ione Plaza apartments, Portland, Oreg.; Republic Construction Co., Los Angeles, general contractors.

165 tons, Washington state Metaline Falls bridge; bids to Olympia, Feb. 14.

Unstated, 561-foot reinforced concrete state bridge, Coos county, Oregon; bids to state highway commission, Portland, Feb. 6.

Unstated, 105-foot King county girder bridge, Sammamish river; Herman Kathman, Seattle, apparently low $46,900.

PLATES . . .

PLATES PLACED

Unstated, sawdust burner for Raymond Lumber Co., Raymond, Wash., to Seattle Boiler Works, Seattle.

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THE ORIGINAL SWING-BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER
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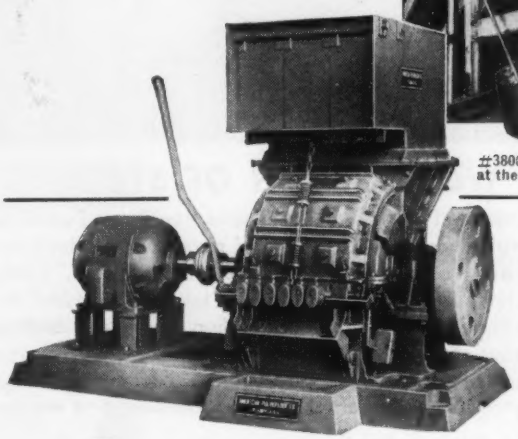
AMERICAN RING METAL TURNINGS CRUSHER

Metal turnings reduced to uniform chips by an American #3800 Crusher are collected for oil reclamation at the Link-Belt Co.'s Ewart Plant, Indianapolis.



Reduced into uniform chips by American shredder ring action, long, curly turnings of steel, aluminum, brass etc. release valuable cutting oil much more freely—30 to 50 gallons per ton! Add the savings in storage and handling—plus the higher scrap value of short shoveling turnings—and it's easy to see why Americans pay for themselves . . . over and over again.

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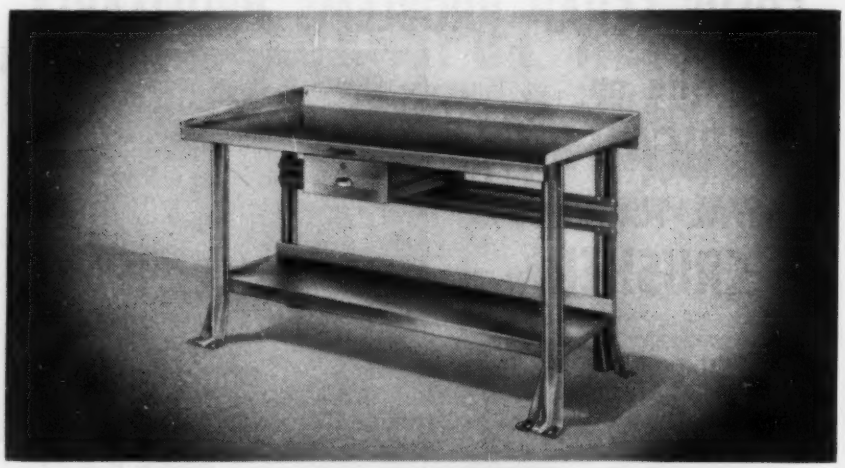

THE HALLOWELL WORK BENCH OF STEEL

Standardized, *ready-made* HALLOWELL Work Benches save trouble and expense of "building your own"; provide superior equipment for maximum productivity.

Interchangeable units readily adaptable to individual requirement. Easily bolted together to form continuous bench, yet may be taken down and reassembled as single units. Rigid, heavy-duty construction eliminates bolting to the floor, minimizes installation and maintenance.

HALLOWELL Work Benches do credit to any plant. Functional design and attractive appearance encourages better plant housekeeping and worker performance.

Full details in Bulletin 701.

SHOP EQUIPMENT HALLOWELL OF STEEL

SPS *Ready-Made, Standardized* STANDARD PRESSED STEEL CO.

JENKINTOWN 33, PENNSYLVANIA

PLATES PENDING

205 tons, penstocks for Fort Peck, Montana dam; bids to U. S. Engineer, Mar. 16.

100 tons plus, 300,000-gallon, elevated water tank for Port of Seattle airport; American Pipe & Construction Co., Portland, Oreg., low $46,586.

Unstated, 2000 feet steel piling, Washington state Metaline Falls bridge; bids to Olympia, Feb. 14.

Unstated, 500,000-gal. water reservoir, Chief Joseph dam; bids to U. S. Engineer, Seattle, Feb. 21.

Unstated, oil storage terminal, Pasco, Wash., for Standard Oil Co. of California; bids to San Francisco headquarters soon.

PIPE . . .

CAST IRON PIPE PLACED

600 tons, 20 and 16 inch, Vancouver, Wash., system expansion, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

Unstated, four miles 6 and 4 in. pipe for replacement, Coulee Dam, Wash.; materials furnished by Bureau of Reclamation.

Unstated, 3800 feet 16 and 12 inch; bids to Marjorie A. Miller, clerk, Kennewick, Wash., Feb. 7.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Central Railroad of New Jersey, 24 diesel-electric locomotive units, eight 1500 hp general utility units and five 1000-hp switching units going to American Locomotive Co., New York, four 1500-hp general utility units going to Fairbanks-Morse Co., Chicago, and seven 1000-hp switchers with four going to Electro-Motive Division, General Motors Corp., LaGrange, Ill., and three to the Baldwin Locomotive Works, Eddystone, Pa.

Seaboard Air Line Railroad, 26 general purpose diesel locomotives, including 12 to Electro-Motive Division, General Motors Corp., LaGrange, Ill.; 11 to American Locomotive Co., New York; 3 to Baldwin Locomotive Works, Eddystone, Pa.

Southern, twenty-one 1500-hp diesel-electric locomotive road units, to the Electro-Motive Division, General Motors Corp., LaGrange, Ill.

LOCOMOTIVES PENDING

Central of Georgia, five 1500-hp diesel-electric road switchers and two 2000-hp passenger locomotive units.

RAILROAD CARS PLACED

Central of Pennsylvania, 125 seventy-ton hopper cars to Bethlehem Steel Co.

Chicago & Eastern Illinois, 25 seventy-ton covered hopper cars to Pullman-Standard Car Mfg. Co., Chicago.

Lackawanna, 300 seventy-ton hopper cars to American Car & Foundry Co., New York.

New York Central, two rail diesel cars to the Budd Co., Philadelphia.

Southern Pacific, 3100 freight cars, including 2000 fifty-ton box cars to Pullman-Standard Car Mfg. Co.'s Bessemer, Ala., plant; 1000 fifty-ton automobile cars, to own shops at Sacramento, Calif.; and 100 seventy-ton drop-end gondolas to Ralston Car Co., Columbus, O.

RAILROAD CARS PENDING

Fruit Growers Express Co., 100 fifty-ton refrigerator cars, to own shops.

New York Central, 500 to 2000 box cars and 500 to 1500 gondolas, the latter for its subsidiary, the Pittsburgh & Lake Erie; bids closed Feb. 3.

Northern Pacific, 500 fifty-ton box cars and 50 cabooses; pending.

Seaboard Air Line Railroad, 300 covered phosphate hopper cars; inquiries out.

St. Louis-San Francisco, 40 seventy-ton hopper cars, to Pullman-Standard Car Mfg. Co., Chicago.

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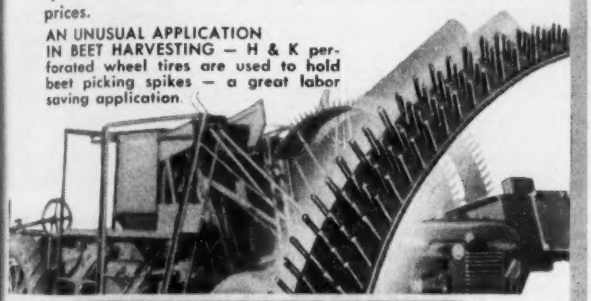
H & K
PERFORATED METALS
(and Sheet Materials)

. . . are employed in the most unusual applications, as well as screening, grading, etc., where extreme accuracy is essential; in safety guarding requiring dependable strength; and ornamental grilles where quality and distinction is paramount. H & K screens are available with tolerances as close as ± .0005 variation in hole diameters. Kind and temper of metal—sheet materials such as: plastics, fabrikoids, etc., may be specified. Your inquiry, regardless of specifications, is invited for recommendations and prices.



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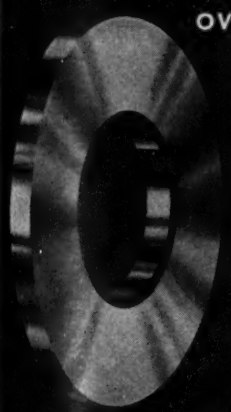

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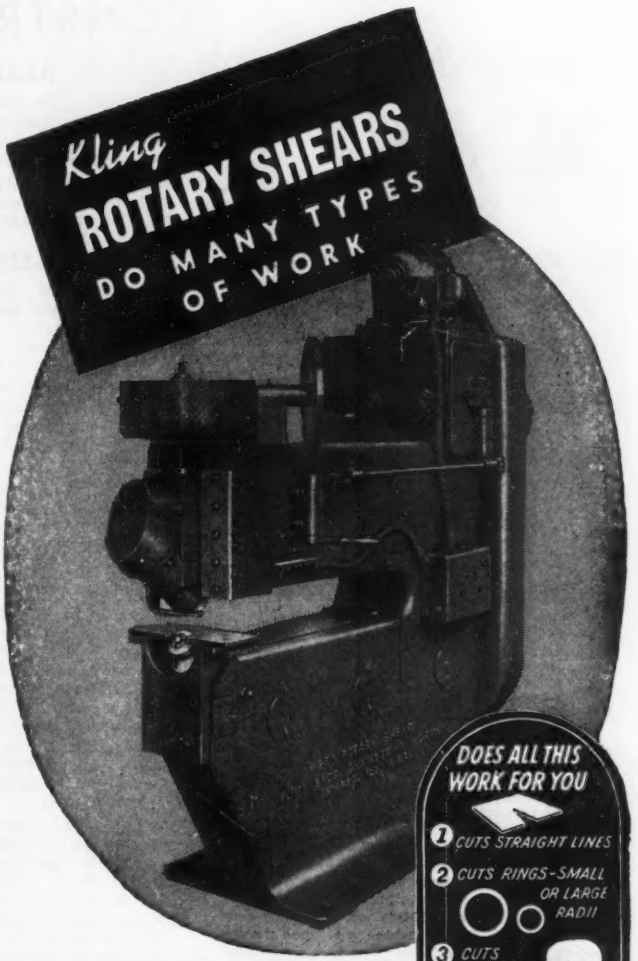

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Rapid operation . . . Hairline Accuracy . . . the use of Kling Rotary Shears marks the latest development in cutting mild steel, and sheet metal, up to 1-inch with amazing savings in time, labor, and production costs.

For exacting projects (see illustration at the right), no single unit of metal-working equipment does so many different things so cleanly and efficiently as does the Kling Rotary, pictured above.

In metal-working plants, automotive, aviation, home appliance, and other industries, where work of this character is being done,—this machine is held in high regard for its versatility and economy of operation.

This great usefulness is the result of half-a-hundred years of engineering experience which prospective buyers, with reason and respect, applaud.

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which will give you specific facts, and specifications. No obligation involved. Users of heavy equipment of Kling Rotary Shears' class will receive a copy of this Bulletin promptly, on request.

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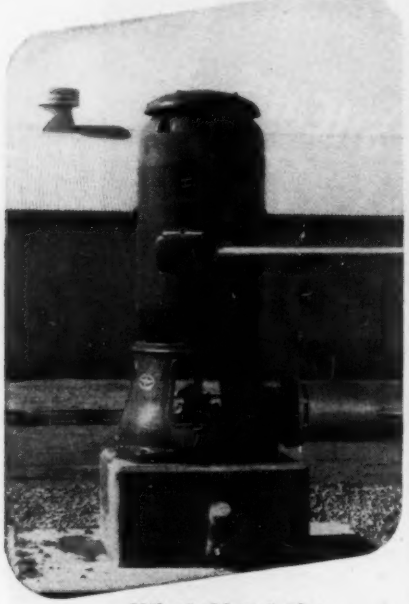

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CONSTRUCTION AND ENTERPRISE

ALABAMA

ANNISTON, ALA.—Anniston Foundry Co., W. H. Deyo, president, announces plans for an expansion program, new plant to cost approximately $250,000.

BIRMINGHAM—Hanna Paint Mfg. Co., Columbus, O., has acquired Hanna Paint Mfg. Co. and plans expansion of facilities.

CALIFORNIA

REDWOOD CITY, CALIF.—Pacific Portland Cement Co. will spend $100,000 on a modernization program of its plant. New filtering, purifying and dust collecting equipment will be installed in three units of the plant.

SAN FRANCISCO—Blum's Inc., candy and confectionery manufacturer, will build a $500,000 addition to its plant. Approximately 30,000 sq ft of working space will be added.

SAN LEANDRO, CALIF.—Purex Chemical Co. has announced plans for construction of a $100,000 plant for manufacture of household chemicals.

DELAWARE

DOVER, DEL.—Gordon Steel Co., machinery, has been chartered by the corporation department of the Secretary of State's office here; U. S. Corporation Co., Dover, is serving as principal office.

DOVER, DEL.—L. S. Watlington Mfg. Co., metals, has been chartered by the corporation department of the Secretary of State's office here. Corporation Trust Co., 100 W. Tenth St., Wilmington, Del., is serving as principal office.

DOVER, DEL.—Universal Jet Industries Inc., machinery, has filed a charter of incorporation with the corporation department of the Secretary of State's office here. United States Corp. Co. is principal office.

DOVER, DEL.—York Electric & Machine Co. Inc., machines, has been chartered by the corporation department of the Secretary of State's office here. Corporation Trust Co., 100 W. Tenth St., Wilmington, Del., is serving as the principal office.

DOVER, DEL.—Burgess Vibrocrafters Inc., leather and metal materials, has filed a charter of incorporation with the corporation department of the Secretary of State's office here; Corporation Trust Co., 100 W. Tenth St., Wilmington, Del., serving as principal office.

WILMINGTON, DEL.—The first phase of structural steel work on the $40 million Delaware Memorial Bridge near here began Jan. 26.

GEORGIA

ATLANTA—International Harvester Co. announces award of contract to Ragnar Benson Inc., 4744 W. Rice St., Chicago, for service parts depot, Oakleigh drive and Harvester street; cost approximately $1.5 million. Norris & Co., 589 Forrest Rd. S. W., Atlanta, has contract for heating, ventilating and air conditioning; White Electrical Construction Co., 946 W. Peachtree N. W., for electrical work; Lewis & Co. Associates, 33 Hunter S. W., for gypsum roof deck; and Crawford & Slaten Co., 820 Woodrow S. W., for sprinkler system.

INDIANA

RICHMOND, IND.—An increase of 30 per cent in production facilities at the local refrigeration plant of Crosley Mfg. Co. has been announced by J. W. Craig, vice president of Avco Mfg. Corp. and general manager of its Crosley Division. Addition of new equipment will enable the Richmond plant to turn out 2500 refrigerators a day.

LOUISIANA

GRETNA, LA.—Southern Cotton Oil Co., L. C. Haskell, 1701 Canal Bank Bldg., New Orleans, received bids Feb. 1 for a shortening plant; August Perez & Associates, Audubon Bldg., New Orleans, architect

MISSOURI

ST. LOUIS—Union Electric Co. of Missouri, 315 N. 12th St., has plans in progress for an office and service building at 18th and Gratiot streets, cost $2 million; Rathmann, Koelle & Carroll, 316 N. Eighth St., architect; William C. E. Becker, Ambassador Bldg., structural engineer; John D. Falvey, 316 N. Eighth St., mechanical engineer.

OHIO

CINCINNATI, O.—Joseph T. Ryerson & Son Inc. announces plans for construction of a large steel service plant and office building, cost in excess of $1 million, to be located on Spring Grove avenue at Adelaide street. The company will continue operations at its present plant at Front street and Freeman avenue until the new project is ready for operations, possibly by fall.

CLEVELAND—Forcite Corp. has been formed by Richard O. Hull of R. O. Hull & Co. Inc., chemical manufacturing firm at 1279 W. Third St. The new company will manufacture and deal in anodes and electroplating supplies. The firm will not do any electro-plating as reported here previously.

TEXAS

BAYTOWN, TEX.—Humble Oil & Refining Co., Humble Bldg., Houston, has plans in progress for six acid plants.

CORPUS CHRISTI, TEX.—Pontiac Refining Corp., Edwin Singer, president, 3400 Lawrence Dr., and Chicago Corp., C. K. Williams, vice president, 135 LaSalle St., plan chemical and refining industry plant, cost $15 million.

FREEPORT, TEX.—Dow Chemical Co. received bids Jan. 26 for an ammonia plant, including mechanical work and equipment, cost approximately $3.5 million.

WASHINGTON

SEATTLE—Lewis Refrigeration Co. reports receiving a $300,000 contract for a refrigeration plant for Consolidated Builders, who have the contract for Detroit dam on the Santiam river, Oregon. The plant will be used for control temperature of mass concrete.

TACOMA, WASH.—Additions and expansion of Hooker Electrochemical Co.'s local plant will be designed and supervised by company engineers, completion planned by October. Increased space will be provided for larger production of caustic soda and liquid chlorine. A new type of electrolytic cell will be installed.

FERROALLOYS

(*Continued from Page* 141)

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., SMxD, bulk, 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lots 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

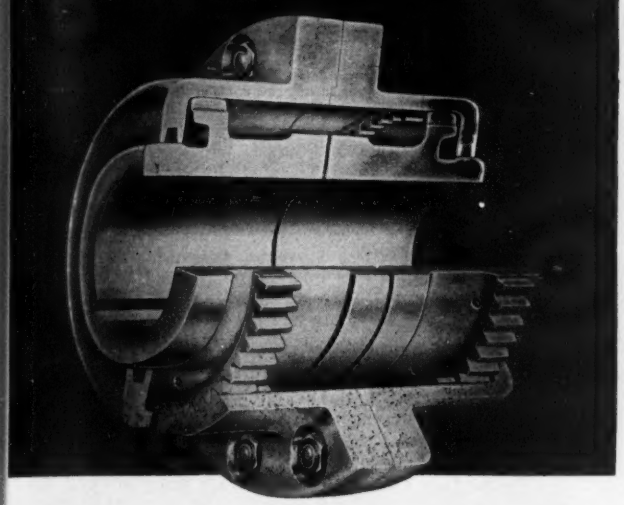
Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. And 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 17.00c per lb of contained Si; packed 18.40c; ton lot 19.50c, f.o.b. Niagara Falls,

POOLE



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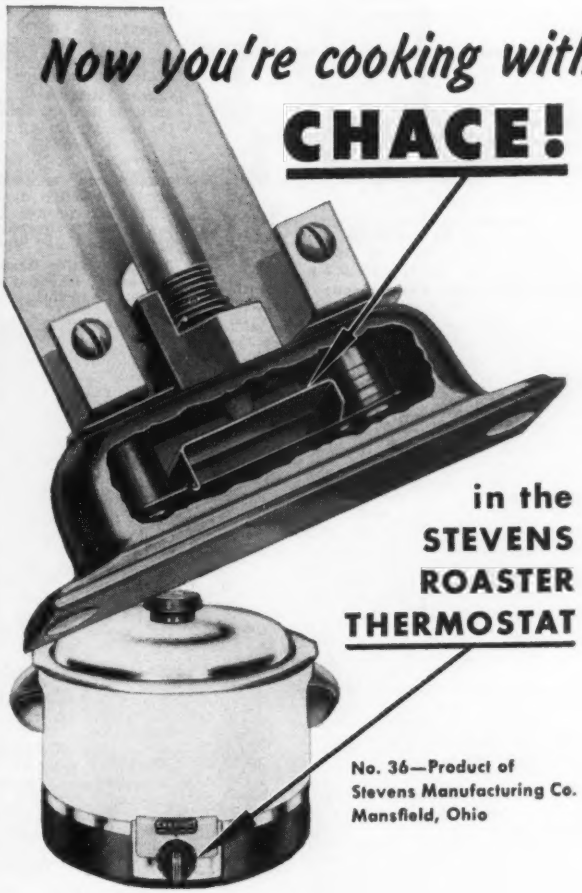

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Chace Thermostatic Bimetal,

that is. It's the actuating element in the new Stevens Type R thermostat, used for precision control of the Swartzbaugh "Everhot" Roasterette.

Requirements for this thermostat include:

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- **Fast response**

. . . making Chace No. 3600 Bimetal the logical choice for its actuating element! Properties of No. 3600 include high deflection and torque rates, with maximum sensitivity between 200 and 600° F. These qualities make it ideal for this application and other domestic appliances.

Your product, too, is more saleable and more efficient when it's actuated by one of the thirty dependable Chace Thermostatic Bimetals. When designing your new product, or re-designing your present one, Chace application engineers can assist you, through their long experience in the fields of temperature response, indication and control . . . consult them.

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N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk, 14.65-15.00c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 19.0c per lb of Si, c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 7.65c per lb of alloy, ton lots packed 9.05c, 200 to 1999 lb 9.40c, smaller lots 9.90c. Delivered. Spot up 0.5c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%.) Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%.) Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.: Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.) $3.10.

Grainal: Vanadium Grainal No. 1, 93c; No. 6 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb contained V_2O_5, freight allowed. Spot, add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

Zirconium Alloys

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract carload, lump, packed 20.25c per lb of alloy ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $4.25 per lb contained B, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb, less ton $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.50c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.00c per lb of alloy; ton lots 18.00c; less ton lots 19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

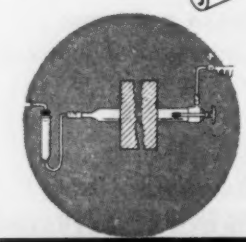
V-5 Foundry Alloy: Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Lump, bulk, carload 11.00c. Ton lots, bulk 11.50c, packed 11.75c. Less ton lots, packed 12.25c per lb of alloy, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); Gross tons per carload, f.o.b. seller's works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.



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